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GAMIFIED PARTICIPATORY DESIGN WORKSHOP FOR CHILDREN WITH ADHD

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ABSTRACT

Nancy Nilsson: Gamified Participatory Design Workshop for Children with ADHD
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This thesis is an exploratory case study on how to organize, create, run and evaluate game design workshop with a combined group of neurotypical children and children diagnosed with ADHD (attention deficit / hyperactivity disorder). The workshop applies principles of gamification and rehabilitation of EXecutive function and ATtention (EXAT) intervention for children with ADHD. This workshop aims to gain knowledge on how to combine game design goals with therapeutic goals in a way that it would both aid in designing an embodied game for remediation purposes for ADHD, and in getting children to feel empowered as well as to help them learn valuable social skills. The workshop used gamified material to guide, support and motivate the children throughout the sessions in both the workshop activities and in social skill training, as well as to collect children's experiences of the workshop. In this thesis, participatory design method, EXAT-based strategies and gamification of the workshops will be described, and conclusions of both efficacy and difficulties of these approaches in this context will be presented. The results of this thesis provide a list of recommendations related to the organization of PD workshop. The children in this work demonstrated improvement in the social skills and they were able to produce creative, usable, and valuable ideas for a game prototype. Based on the feedback gathered from the children, the workshop and the game design activities were enjoyable and successful in empowering the children.

Keywords and terms: participatory design, game design, children with ADHD, workshop, games, active gaming, gamification, child-computer interaction, embodied interfaces

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1 INTRODUCTION

Participatory Design (PD) is a method used in Human-Computer Interaction (HCI) to create interactive products (Bjerknes et al., 1987). One of the key features of PD is that it involves various stakeholders – developers, business representatives, policy makers, and end users – into the process of co-creation for better design outcomes. PD is a complex and multifaceted method that can be time- and cost-intensive. Hence, it is mainly used when a computer system project has high risk and likelihood for failure but also when there is a high payoff if the project is successful (Lazar et al., 2017). PD is ideal for developing systems and products especially in those situations where a deep understanding of the context is needed.

In recent years, with the growing interest in games and *gamification* (using game-like elements outside of games (Brewer et al., 2013; Slegers et al., 2016)), PD is employed for creating gaming applications with children (see e.g Melonio, 2016). As co-creators, children are expected to contribute to the design process as experts of their gaming experience by giving ideas so that designers can understand what children value, find entertaining, and motivating or distracting (Gennari et al., 2017). Children are naturally creative and are eager to share their sometimes unconventional viewpoints (Melonio, 2016), which in this case are important, since they are the end users of the product. Noteworthy, children's ideas of fun might differ from those of adults (Magnussen et al. 2003). In addition, children of different ages may prefer different game genres, content, and choice options and have variable abilities to master the nuances of particular types of games (Baranowski et al., 2016). Therefore, it is vital to involve children into the design process already at the early stages of development.

Gamification (see Hamari et al., 2014) is a trending field not only in academia but also in education, health care, and the business world. As our way of working becomes more digital, the knowledge of video games and exploiting them in other contexts than playing, has become an everyday method in various fields, including school environments as well as in fitness applications

to motivate people to take care of themselves. The use of game based methods in the field of (HCI) has been acknowledged (see e.g. Brewer et al., 2013) since they can provide e.g. a safe and comfortable setting for the participants, enhance future thinking (Slegers et al., 2016), and increase motivation (Sailer et al., 2014).

There is increasing awareness of including children with neurodevelopmental disorders into the design of educational and skill-building games (see e.g. Malinverni et al. 2014, Guha et al. 2008, Benton et al. 2012). Neurodevelopmental disorders are known to impair brain structures responsible for executive, memory, and perceptual functioning, in many cases resulting into difficulties with concentration, working memory, problem-solving, behavior inhibition, and communication with others (DSM-5, 2013). Therefore, co-designing with children with neurodevelopmental disorders needs to take into consideration abilities and limitations of this special user group. Earlier research in PD mainly targeted children with Autism Spectrum Disorder (ASD) and other learning disabilities. Despite the fact that Attention Deficit / Hyperactivity Disorder (ADHD) is the most prevalent neurodevelopmental disorder (Smalley et al., 2007; Simon et al., 2009), there surprisingly has been little research focused on including children with ADHD as co-designers in participatory design. The core deficits of ADHD are inattention or inability to focus, hyperactivity of moving excessively, and impulsivity associated with poor behavior inhibition. Thus, there is a clear need to create specifically tailored methods for ADHD children. Instead, ADHD children are made to adjust to mainstream settings, especially in education, where they are often offered learning tools that are not suitable for their special needs (see e.g. McKnight, 2010). Even though there has been collections of guidelines on how to design for ADHD children (McKnight, 2010; Krča, 2016), rare, if any, studies have included ADHD children in design teams or reported how PD workshop could be practically organized with ADHD participants. Such knowledge would be extremely rewarding not only for the children but also for the development teams. While earlier PD research involved children with neurodevelopmental disorders such as autism, the workshop sessions

themselves were not explicitly attempting to serve for rehabilitation purposes. Yet, PD as an environment, given its collaborative and social nature, can serve as an intervention in itself. In the work presented in this thesis, children were encouraged to participate in the design process and certain measures were taken to accommodate their special needs (Rantanen et al., 2018). However, currently no guidelines exist on how ADHD rehabilitation principles could be implemented into PD practise.

The aim of this thesis was to develop a participatory game design workshop suitable for children with ADHD in a way that not only produces usable ideas for a final game but also empowers the participants and teaches them skills to improve self-organization and social interaction. This also acted as a way to introduce children to the game development process. Since children needed to work as a part of the team and experience difficulties of the design process, there is a need to teach them how to structure their work to meet deadlines, communicate and provide feedback. This is difficult for children, and possibly even more so for ADHD children. This study was conducted in collaboration with a research project by Tampere Unit for Computer Human Interaction Research Center (TAUCHI) and Psychology Clinic PSYKE, both located at Tampere University. The project aimed to develop therapeutic games for individualized training of behavioral and cognitive functions needed for ADHD remediation. The PD workshop utilized one of the early game prototypes implemented in the project. The participants helped to develop a Kinect-based therapeutic game-like application called *Pigscape*, that is being used in clinical trials by PSYKE since January 2019. The workshop´s child participants were addressed as the Children Research Advisory Group, consisting of two ADHD and two neurotypical school-aged children. During the workshop sessions, children worked as members of the design team and contributed to game design by customizing game characters, game elements, levels, and creating a game narration. The intention was to include children early on to the design process, to offer them an opportunity to make decisions, and show how their suggestions were realized, which we anticipated to positively affect their self-esteem (McNally et al., 2011). The innovation of the

current workshop was in the integration of principles of EXecutive function and ATtention (EXAT) intervention for children with ADHD developed in PSYKE (Rantanen et al., 2018). EXAT is a structured neuropsychological multilevel group intervention developed for children with executive function deficits and more details of it are provided in section 2.3, while section 3.3.2 describes how those principles were implemented into the workshop. Moreover, gamification strategies were incorporated to the workshop to support the aforementioned principles, foster motivation and increase the children's engagement into the activities, and to aid in gathering their opinions about the workshop. Gamification strategies will be described in section 3.5.

Conventional methods of gathering children's experiences can be challenging because they might have difficulties in expressing their opinions (Tuukkanen et al., 2018). To approach the children differently to gather their detailed, perhaps more honest opinions, a new method was developed. This method uses a combination of visual cues, gamified material and think aloud protocol, as described in section 4.5. Qualitative data was gathered through direct participant observations and field notes. More data was collected through video recordings, pictures and images, documents, rating scales, interviews, and children's drawings and creations.

The research questions in this thesis are a) how can children follow the proposed workshop structure and activities, and do EXAT-based strategies aid ADHD participants in getting involved into the design process and enhance their social skills? and b) whether and how implementing gamification elements to the workshop structure and activities affect children's motivation to cope with the workshop activities and providing their impressions of the workshop? To answer these questions, a multidisciplinary study was conducted combining knowledge and using methods of HCI (user-centered design, software prototyping), psychology (EXAT), and game design (gamification, paper prototyping). The outcome of this work is to gather practical first-hand experiences of organizing this type of workshops and provide a list of recommendations for multidisciplinary research teams.

This thesis follows a typical structure. After the introduction, the second section presents an overview of the current literature and knowledge on participatory design with children with special needs, gamification and therapeutic games for ADHD, and explains the EXAT -strategies while the objectives and research questions will be presented after. Section 3 introduces the EXAT -framework and gamification methods, the game prototype and the overall planning of the workshop. Section 4 then describes each session in detail including their respective aims and themes with observations regarding the children's behaviour. Section 5 discusses the findings in three subcategories: outcomes of the game design goals, outcomes of the facilitation goals and participant feedback. Lastly, guidelines based on the experiences are recommended. Section 6 is dedicated to the discussion and Section 7 concludes the thesis with suggestions for future work.

2 BACKGROUND

This chapter examines previous work regarding game related participatory design with children with neurodevelopmental disorders and therapeutic games for children with ADHD. The EXAT -rehabilitation intervention program framework, the Pigscape-game prototype, and my contribution and aims of the thesis will be described.

2.1 Participatory Design with Special Needs Children

Participatory Design (PD) with children has been employed design technology (Read et al., 2014; Druin et al., 1998; Druin, 1999; Druin, 2002) but recently it has also expanded into the field of game design: not only to understand the game design process (Gennari et al., 2017) and producing better products (Malinverni et al., 2014; Khaled & Vasalou, 2014), but also to explore what children gain from their participation in such processes (McNally et al., 2017; Schepers et al., 2018). Maliverni´s group (2017) proposes an inclusive model for game design with children with neurodevelopmental disorders. This model merges therapeutic techniques, game design, and children's interests into a coherent whole, which requires different stakeholders involved in various stages of the design process. The model follow four steps, which starts with properly defining therapeutic goals and the structure of the experience. Then, the contributions from children, in this case children with ASD, are elicited aimed towards their interests. Next, the contributions from the experts and children are integrated in order to define the game experience as a whole, including the game mechanics and elements. The fourth and final step is the exploratory evaluation of game suitability with children with ASD. Gennari´s group (2017) conducted a study with primary school children that assessed, how children perform in game design and if they are engaged in design tasks. Because games are complex to design, the tasks should be adapted to the participants skills and knowledge. PD should enable children to perform well in the design tasks – so that children are engaged in the activities. Gennari´s group used a participatory

game design method called *Gamified CO-design with Cooperative learning* (GaCoCo), that employed gamification to organize design sessions and tasks as in a game. Here, cooperative learning refers to a constructivism based learning methodology supporting positive relations to achieve collaboration between children and adults (Slavin, 1991). This was manifested by using gamified material with clear and intuitive functionalities for children to enhance progression, control, and relatedness as well as cooperation through the activities and sessions. Gamified material can be, e.g. a progression map that guides the children through the design activities and shares their accomplishments (Gennari et al., 2017).

There have been multiple studies (see e.g. Benton et al., 2012; Porcino et al., 2015; Guha et al., 2008; Read et al., 2017; Malinverni et al., 2017) on PD with special needs children, especially those with Autism Spectrum Disorders. Malinverni et al. (2014) conducted PD workshop with ASD children where the aim was to integrate the children's contributions into the design of a Kinect-based game. They acknowledged that even though this group could benefit from participation the most, their role in the design process can be difficult to define properly. It is a delicate issue to find the balance between sufficiently recognizing children's skills and contributions and without overwhelming them. Their findings show that several contextual and material aspects, such as the constancy of the setting and the use of personal storage boxes, supported PD activities with ASD children. When working with ASD children, it is important to balance between the socio-affective needs of the children (of feeling empowered and gaining meaning from participation) and the functional constraints in designing a workshop. This would be a significant aspect in designing activities that are both useful for design and empowering for children. As many studies have focused on how to overcome deficits, such as inattention or hyperactivity, Benton et al., (2014) created a framework "Diversity for Design" (D4D) which instead capitalizes on neurodiverse children's strengths and support possible difficulties. The framework aids in guiding design research and PD methods to enable the participation of neurodiverse populations. The key principles in this framework are: a)

understanding culture, knowing the characteristics observed in the condition; b) tailoring for the individual, that is knowing the characteristics specific to the individual such as skills levels, special interest, or personality; c) structuring the environment, i.e. creating predictability in the sequence of activities and matching the environment to the individual's abilities; d) and providing support, such as providing visual representations of task instructions in addition to verbal enforcement. In this thesis work, the aim is aligned with D4D, which is designing to support strengths instead of only overcoming deficits.

Druin (2002) identified four different roles that children can play in the design of technology. These are *user*, *tester*, *informant* and *design partner*. When in the role of design partner, the role of the child is considered equal with other stakeholders throughout the design process of new technologies, contributing to the process in ways appropriate both for children and the process (Druin, 2002). Iversen et al. (2017) suggest to deepen the understanding on how children may be empowered through design. The goal is to give children a voice in the design process and to reflect the role of technology in their practises. In this thesis work, the children acted as design partners, co-designers so to speak, provided their ideas and contributions by customizing and designing game elements: the avatar, collectables, scenery, and the narrative. Druin (2002) has also recognized that the roles children play in the design process can not only affect the technology design process, but it may also have an impact on what kind of technologies are being created (see e.g Taxen et al., 2010).

It is worth considering, what are the benefits for children to participate in such activities. McNally et al. (2017) have identified, through their research and literature, that some of the most notable gains for the children alumni has been regarding for example collaboration, communication, confidence and learning various design techniques. Despite several published works on children with ADHD and gaming (e.g. Farcas et al., 2016; Strahler Rivero et al., 2015), there is a research gap in understanding how to practically organize game design workshops for ADHD children. Nor are there guidelines on how

to involve ADHD children as game co-designers at early stages of game development.

The Child Barometer (Tuukkanen et al., 2018) focuses on gathering experiental data from young children. It highlights the importance of children's rights and hearing their voice not only as a basis for better political decision making but also from children's point of view to provide a channel for them to participate with the possibility to influence decisions affecting them. However, there is clearly a lack of research and availability of enough suitable methods to gather children's experiences. For example, in the study it was revealed that there is a difference between data collected via different interview methods with children. Compared to phone interviews, the children were chatting more and giving more positive responses when interviewed face-to-face (Tuukkanen et al., 2018.). Getting feedback from the participants is valuable not only for future iterations of such workshops but also to examine possible gains the participants might perceive from taking part in such activities. However, getting valid feedback from children regarding their experiences can be problematic since children may have difficulties in expressing their opinions or other factors, such as the environment or the method in which the data is collected, might affect their answers. In addition, the answers might not always provide clear and concise information. This can be the case especially with children with special needs who may be impaired with their communication or creative skills (see Frauenberger et al., 2011). One way to overcome these limitations would be to explore gamification methods also for eliciting feedback, as was explored in this thesis work.

2.2 Gamification and Therapeutic Games for ADHD

The use of video games, or gamification, in health care and therapeutic applications is widely acknowledged as gamification is known to foster motivation to complete tasks (Sailer et al., 2014). The applications can vary from physiotherapy (see e.g. Cary et al., 2014) to training cognitive control in adults (see e.g. Anguera et al., 2013), and supporting children's emotional

development (Fan et al., 2018). However, when talking about games used in therapy, the concept of *serious games* should be distinguished from gamification. Where gamification refers to explicit use of game elements in non-game context, serious games are full-fledged games developed for other purposes than entertainment (Sailer et al., 2014). Some typical elements of games that gamification employes are avatars, points, badges, progress bars, and leaderboards. Avatars are a main component of role-playing games and are distinguished from characters by their form of representation. A character is an agent through which a story is told (Fullerton 2014, 96) and refers to the portrayal of a person, where as an avatar is only the visual representation of the player. There have been many definitions of avatars in video games (Waggoner, 2009) but in this context, an avatar means a virtual representation of the user in a video game. To be able to create or choose your own avatar can contribute to a more enjoyable play experience (Lim & Reeves, 2010; Kinzer, 2014) and increase motivation (Sailer et al., 2014). Other motivational elements include points that can be collected, badges as visual representations of achievements, progress bar showing the player´s progress towards a goal, and leaderboards where the player can compare their results with others (Sailer et al., 2014).

There are studies with promising results regarding improved therapy related health outcomes by playing active video games (Staiano & Flynn, 2014) and consequently, there has been increased interest in using serious games in rehabilitation of children with various conditions. A recent proof-of-concept study (Davis et al., 2018) provides preliminary support that a video-game like interactive program could be effective in improving attention, working memory and inhibition in ADHD children. Bull et al. (2018) conducted a study which aimed to understand which groups of ADHD children would benefit the most in playing serious games. The participants were instructed to play a serious online game (developed for this purpose) that aims to improve functional outcomes in daily life such as time management and cooperation skills. As there was a difference in effects between these groups, they found that the two types of participants who benefited the most from this kind of training were girls with ADHD in general and boys with lower levels of both hyperactivity and

conduct disorder. In this thesis the aim was to customize/personalize a therapeutic Kinect-based game for children with ADHD through PD workshop sessions with neurodiverse children.

2.3 Rehabilitation of Executive Function and Attention (EXAT)

The goal of the Cognirem project is to create interactive and skill-building game-like training applications, which will aid children with ADHD to overcome certain deficits of ADHD: *inattention*, *hyperactivity* and *impulsivity*. The workshops were designed following theories and guidelines from EXAT (rehabilitation of EXecutive function and ATtention), which is a structured neuropsychological multilevel group intervention developed for children with executive function deficits at the Psychology Clinic of Tampere University (PSYKE) (Rantanen et al., 2018). EXAT is a form of medical rehabilitation based on principles of neuropsychological rehabilitation, integrated with an evidence-based behavioral modification approach. EXAT combines several psychosocial treatments: child group training, parent training, and teacher consultations. EXAT has a long history in clinical practice, aiming to reinforce executive functions and self-control, improve social competence and foster the children's positive self-esteem. Evidence shows that EXAT has positive effects on children's behavior regulation skills by decreasing impulsivity and restless behavior (Rantanen et al., 2018). Of interest for the current workshop are the following models and theories that EXAT is based upon.

Barkley (1997) suggests that attention deficits are rather a lack of impulse control, which gives rise to behaviors like fidgeting. He bases this as the core deficit in children with ADHD. From his model of inhibition, emerges the need for a structured program that has fixed and achievable goals and uses visual aids. The model aims to support and develop executive functioning, including those pertaining to attention and memory, through guidance on tasks using simple verbal instructions. From this model, the need for a highly structured program with visual aids was determined.

Energetic and vigilance model (Sergeant, 2000; 2005; van der Meere, 1996; van der Meere et al., 2010) was the first to suggest that the challenges associated with ADHD might be due to under (not over) activation. For best or optimum performance, children need to be aroused or excited. Therefore, if a child is under activated by their environment or task, they need to move, or get energy in some other way to get back to the optimum or desired activation level. In this way, the challenges brought out by ADHD are reduced when the child achieves the right activation level, which is achieved by movement. Therefore, children compensate for the low activation by movement. From this model, the need to allow movement within the sessions and to have a different environment for different activity was derived.

Children need more immediate feedback to stay focused in a busy environment. Moreover, there should be a focus on positive reinforcement, thus, ignoring bad behaviors. Feedback or reinforcement need not only be verbal and can include non-verbal gestures (e.g. thumbs up, nodding and smiling). In schools in Finland, teachers use the *red, yellow, and green* cards (based on traffic lights), where red or yellow cards are used less than the green card. The traffic light model is usually familiar to the children. Timeouts are also used sometimes to calm down an overwhelmed or overstimulated child, for instance, asking them to take a walk or go to the other room (but not sent to a corner). From these motivational theories (Sonuga-Barke et al., 1992), the workshops incorporated positive reinforcements and timely feedback.

In this thesis, the aim was to apply EXAT -based strategies into the PD workshop for ADHD-diagnosed and neurodiverse children.

2.4 Objectives and Research Questions

The workshop had a combination of game design goals and facilitation goals. Firstly, there were game design goals to validate the initial game idea and advance an early game prototype with avatar customization, narrative, environment, and collectable elements based on input by the child participants. The workshop was aimed to produce a functional and appealing game to be

used by children with ADHD during a forthcoming clinical trial. Essentially, the participants were expected to work as co-designers together with other game developers through participatory activities. Thus, their main contribution was in creating the visuals and backstory for the game. The participants would also test parts of the resulting game and verify the functionality of motion-based controlling methods, game mechanics and the visual appeal of the game.

The workshop also aimed to provide an inclusive, positive experience for the participants and introduce them to some features of game development. Therefore, it was planned to present the process of game development to the children, starting from customizing the avatars and the environment to creating narratives. This was also achieved by promptly implementing children's work so that they would see how their ideas are incorporated into the game prototype throughout the sessions. Children would also experience some challenges of the design process, such as bugs (in-game technical complications) in the software, time constraints and team communication. Communication in the team can sometimes be difficult, for example agreeing on an idea to be implemented in the game, or when providing (sometimes negative) feedback to teammates. This can be challenging for children in general, and more so for children with ADHD. Therefore, the workshop had facilitation goals to incorporate strategies based on EXAT -principles. The strategies included adoption of a highly structured program for the sessions with a predictable schedule, environment modification as well as positive reinforcement and modelling of socially acceptable behaviors. Knowing the difficulties that ADHD children face, sessions were designed to implicitly support the children in the game design tasks, thus, helping to achieve game design goals. Additionally, the sessions were also designed to explicitly teach children the skills of social interaction and self-organization that are required in team work. These skills were formulated as the 4 "I" - statements: *I participate*, *I am a team member*, *I am a timekeeper* and *I pay attention*. They were based on a rehabilitation program from the psychologists involved in the project. They were emphasized and practised in a relaxed atmosphere throughout the sessions and they will be described in detail in section 3.3.1. A brief analysis of the ADHD children's behaviour, when

relevant, during the sessions is included in the session descriptions in section 4. To increase motivation in children to complete all the workshop sessions, the activities in them, and practising the skills, gamification was used in both designing the session activities and enhancing the social skill training.

As this project was done in collaboration with other researchers, both their and my role in the workshops are described in section 3.2. My research was both constructive and experimental in its nature, with the following objectives:

- Based on a preliminary outline for the workshops provided by the project lead, objective 1 was to plan in detail the themes for each session, their chronological sequence that would create a sense of continuation between the sessions for participants, and planning the practical game design tasks for each session.

- Working in collaboration with other researchers, objective 2 was to incorporate elements of EXAT rehabilitation intervention into the workshop. The idea was to make the workshop particularly suited for ADHD child participants, thus, challenges and ways to accommodate ADHD children needed to be studied and a set of facilitation strategies were implemented into the workshop structure and activities.

- Objective 3 was to create and include elements of gamification into the workshop to increase children's motivation to cope with the workshop activities and collect children's impressions of the workshop.

- Based on my expertise as a graphic designer, objective 4 was to rapidly create commercially looking game graphics based on children's contributions in a way that they could follow how their ideas were implemented to the software prototype during the

workshop. Seeing their work, it was anticipated to increase children's motivation and empowerment in the design process.

- The combination of the game design goals and facilitation goals required not only careful planning but also rapid between-session iterations to the plans so that those goals could be realized. Objective 5 was to organize briefing meetings with other researchers after each session and update the team about progress in design and how the session and activities were received by the children, and define what is implemented for the next session and modify it if needed.

These objectives were met successfully and will be discussed in the following sections: objective 1 in section 3.3, objective 2 in section 3.3.1, objective 3 in section 3.5, objective 4 in section 3.3 and 4, and objective 5 in section 3.3.2.

To accommodate these objectives, two research questions were formulated:

RQ1: How can children follow the proposed workshop structure and activities? Do EXAT -based facilitation strategies aid ADHD participants in getting involved into the design process and enhance their social skills?

RQ2: Whether and how implementing gamification elements to the workshop structure and activities affect children's motivation to cope with workshop activities and providing their impressions of the workshop?

These research questions are answered in section 6.

This section started with a literature review on previous work regarding participatory design with children with special needs, gamification and therapeutic games for ADHD children. The EXAT-principles were introduced and the objectives and research questions of this work were presented.

3 PARTICIPATORY DESIGN AND GAMIFICATION METHODS

This section describes the participatory design and gamification methods starting with a brief mention of the ethics permission. Then, it will be continued with descriptions of the workshop participants and the research team followed by the EXAT-based facilitation strategies, the workshop planning, the game prototype and how gamification was used in the workshop.

3.1 Ethics

Humanities Ethics Committee of the Tampere region, Tampere University gave a positive statement to the research (see statement 36/2018 "Embodied games for cognitive and behavioral rehabilitation of attention deficit/hyperactivity disorder"). The research was supported by the Academy of Finland (decision number 308929) and Tampere University[1]. Thus, it allowed to conduct a study with neurodiverse children to explore PD.

Written informed consent to participate was obtained from the participants´ parents. The child participants signed the informed consent as well after being verbally explained the details, how the data is being used, and the compensation they would receive. The compensation was two movie tickets per child if they participated in all of the sessions and one movie ticket if they attended three sessions.

3.2 Team Members

Children Research Advisory Group: The role of the child participants was to act as design partners; design collaboratively, provide feedback to others´ designs and to test the final designs (Druin, 2002). Child participant profiles are mentioned in Table 1.

[1] Project Funding:
http://webfocus.aka.fi/ibi_apps/WFServlet?IBIF_ex=x_HakKuvaus2&CLICKED_ON=&HAKNRO1=308929&%20UILANG%20=en&IBIAPP_app=aka_ext&TULOSTE=HTML

Table 1. Child participants profile. TD=Typically developed, ADHD= Child with an ADHD diagnosis

Code	Gender	Age	Native Language
P1 (ADHD)	male	12 years	Finnish
P2 (ADHD)	female	12 years	English
P3 (TD)	male	10 years	Finnish
P4 (TD)	male	10 years	Finnish

Roles of the research team and software developers: The team included researchers and software developers. Their roles are mentioned in Table 2.

Table 2. Research team and software developer profile.

Code	Role	Task	Sessions present
R1	Facilitator	planned and moderated all sessions, took notes, was also the graphic designer	5
R2	Assistant	English script reader, assisting	3
R3	Assistant	observing, assisting	5
R4	Observer, psychology student	rewarding children with points and explaining what they were for, observing behaviour	5
R5	Assistant	observing, assisting	4
R6	Software developer	designing the game mechanics, coding, practical implementation of the graphics, demo sessions	2
R7	Software developer	designing the game mechanics, coding, practical implementation of the graphics, demo sessions	2

R1-R4 were attending the first three workshop sessions, the last two sessions both had R1, R3 and R4. The team also included software developers, R6-R7, who designed the game mechanics. R1 was in the role of a facilitator throughout all of the sessions. The facilitator role included helping the participants to understand the objectives and making the social interactions as smooth as possible by providing unobtrusive assistance. In addition, the facilitator was also a graphic designer. R4, who is studying psychology, had the role of observing the participants. R3 and R5 were present to help if needed, observing and to be part of the team but they did not take part in the actual design activities.

3.3 Participatory Design Workshops

The workshops had one hour sessions on five consecutive weeks. Each session´s theme, goals and expected results can be found in Table 3. In these sessions, the child participants were acting as informants and also as co-designers. The participants were recruited by PSYKE and through personal connections of the researchers. One participant was an English speaker while all the other spoke Finnish as their mother tongue. The research team was international which made the working language English. However, facilitation was primarily conducted in Finnish since the Finnish children were not fluent in English. The reason to include both Finnish and English speaking participants was due to the availability of them as well as to reinforce the international characteristics of the research team. Each session had a written script (appendix 1) to aid in the multilingual execution of the workshops. One researcher explained and followed the script in English for the English speaking participant. All four children participated in all of the sessions. To benefit from the EXAT facilitation strategies, the workshop was structured on their rehabilitation framework.

Table 3. Session overview.

Session & Theme	Goals	Expected results
Session 1: Introduction, Avatars	**Introduce the game (graphics).** Children were shown the initial demo as a game play video. **Customization** of the main character - create a bond to the character **Teaching skills "I participate", "I am a team member", "I pay attention", "I am a timekeeper").**	Ideas of funny characters, fun interactions. Children create an emotional bond to their character (increases motivation) Ice breaking, team building. Children are able to actively take part in session activities and follow social rules modelled by a facilitator
Session 2: Postures and Narrative	**Introduce how the children´s ideas were implemented** **Ideas for postures in "Hole in the wall" minigame, Create narrative** What is the story of the pigs; why are they running? Where to/from are they running? Repeat and practise the 4 I -skills	Children will feel empowered by seeing their ideas implemented into the game demo Ideas of fun events,backstory for the pigs, fun interactions. Children are able to take part in session activities and demonstrate the skills
Session 3: Scenery and Collectables	Enhance/customize environment & scenery; trees, obstacles, collectibles and other elements Repeat and practise the 4 I -skills	Ideas of fun elements, interesting levels Children are able to take part in session activities and demonstrate the skills
Session 4: Game demo, Feedback	**Introduce how the children´s ideas were implemented** Demo **Test the gestures and Kinect functionalities with children** **Collect feedback**	To see what works and does not work in the current game demo Children are able to actively take part in session activities
Session 5: Feedback and Award Ceremony	Test the game and find out how the children perceive the way their ideas were implemented Children are awarded for their participation	To see what works and does not work on the current game demo Children see their work in action and feel accomplished Children feel they had an important role in the game development and feel acknowledged

3.3.1 Facilitation Strategies

The facilitation strategies developed for the workshop are based on the four pillars of EXAT: highly structured program, environment modification, positive reinforcement, and social skills training.

Highly structured program: Having a highly structured program allows the children to train to become more efficient in conducting tasks and achieve high-level goals. Barkley's (1997) model of inhibition and executive functioning proposes a program that is structured, has fixed and achievable goals, and uses visual aids to guide the children's attention to the task at hand. To guide the structure of the workshop, an agenda was made visible on a whiteboard and described verbally by the facilitator. A checklist for each activity was created, where an assigned "timekeeper" would tick off an activity after it was completed. The general agenda was as follows:

- **Introduction (10 mins)** The topic of the day introduced and there was also a quick wrap up of what was done on the previous session. A progress bar was shown and mentioned to let the children see where we were in the sessions and to let them understand that each session was part of something bigger instead of the sessions being perceived as loosely connected activities. The 4 I´s were presented, repeated, or discussed.

- **Workshop activity 1 (20 mins)** The activity was different each time, corresponding to the theme of the session

- **Break (5 mins)** A short break was planned to allow children to move around in the space. The break was dropped in case it was not needed.

- **Workshop activity 2 (20 mins)** The activity was different each time, corresponding to the theme of the session

- **Relaxation & wrapping-up (feedback and conclusion) (5 mins)**

- **End of the session**

Each session lasted for approximately 60 minutes. This duration was decided because the team wanted to cause minimal strain on participants´ schedules and to ensure that they would feel that attending the workshops is not too much of an effort. The workshop sessions followed a structure that was always the same, excluding the adaptations made to the schedule in the first session and some minor adjustments made later if needed (e.g. if some activities or discussions were considered important to continue even though the time reserved for them was out). The agenda was displayed on a whiteboard as a checklist to children to track the progress. Each session had generally two separate workshop activities followed by discussions. Snacks were offered in the beginning of the sessions so that the participants could simultaneously eat and listen to the agenda of the day, since several of them came directly after school and were hungry.

Each session had a separate theme and goals (Table 3). To enhance the experience, also to know when to move to the next activity, an aural cue was used to guide the structure of the sessions. We used a squeezable pig dog toy, that was making an oinking sound, as our alarm. This is referred to as the "pig alarm". A detailed example script of a session can be found in appendix 1.

Environment modification and positive reinforcement: The energetic and vigilance model (Sergeant, 2000; 2005; van der Meere, 1996; van der Meere et al., 2010), implies that problems associated with being under activated or with vigilance are mainly manifested in a school environment, where the tasks are similar day in day out, and can be boring (sit and read). In this workshop, it was important to understand over stimulation or over activation since the environment, tasks and people are all new. Thus, environment modification, which can activate children in a good way and enable hyperkinetic children to move around, was used. There were several planned areas for the children in the workshop space: a big table for artistic work and a space with round tables where children were seated and listened to updates and plans for the day´s session. In addition, there was a game testing area in front of a large screen, where software developers demonstrated improvements to the game. If the environment is too

busy (e.g. many objects, colors, people, distractions), it can be overwhelming for a child with ADHD making it harder to stay focused. Overstimulation was handled through environment modification.

From theories on motivation (Sonuga-Barke et al., 1992), we incorporated positive feedback for the children in different ways. This was done by evaluating the rules or goals the children had (sitting still, or taking turns) and by giving feedback to each other. To evaluate participation, adult perspective for child participation was given; adults would positively tell the children how well they did with activities, also individually, as individual feedback is important. If someone would misbehave, comments as "let's try to get better next time we meet" with some positive feedback such as "You tried well" were used. Thus, good behaviour was prized, bad was ignored. Moreover, when the children ´s ideas are implemented into the game and shown to them in the workshop, it is also a positive reflection of their participation. Reinforcements, such as touching the child's arm, shoulder or a pat on the back, can be used to give positive feedback during the tasks. In the PD sessions, we incorporated this method by touching the shoulder and asking to listen or wait a little. To get feedback from children, open ended questions, such as what they have learnt during these workshop sessions, were asked.

Social skills training: During the sessions, there was an opportunity to strengthen skills for collaboration and social interaction by using negotiating strategies coupled with feedback. Adults and children were considered to be on the same team. Further, there needed to be strategies in place to handle conceivable conflicts in social situations. It was important to decide how much the children would compete, that is, choose one design from four by say voting. However, competition was eliminated since there was a possibility to incorporate all the individual ideas in some way or form and the focus was shifted to collaboration. To overcome disappointment and other negative emotions, such as, anger or frustration, one way was to use distractions and have timed tasks. The newness of the activities helped keep the children focused and the short times reduced the chances of disappointment. Social skills were included in a

form of 4 I statements: **I participate, I am a team member, I pay attention** and **I am a timekeeper**. These skills were modelled by the facilitator and practised in a form of saying something, treating others nicely and giving feedback to others, not interrupting and keeping track of time, and following the schedule. Children were repeatedly told to practise these.

3.3.2 Workshop Planning

The workshop planning process (see Figure 1) started from the research aims that were split into facilitation goals and game design goals. Based on these goals, each workshop session was planned in detail. As the workshops took place weekly, there was always one week to plan the sessions in detail.

Figure 1. The workshop planning process.

After each session, the research team had a meeting with discussion on how things went, what worked and what did not. Adjustments were made to the plans if needed. After the briefing session, graphics were created based on the children's input and were implemented into the game by the software developers. This iterative process allowed improvements or modifications to the sessions and helped in the planning of the workshop. This was repeated weekly until the last workshop session, after which there was a final concluding meeting with the research team.

3.3.3 Workshop Environment and Apparatus

The workshop used multiple materials and technical equipment. These were used in all of the sessions. The materials used are listed below:

- Several boards were used in the session. This included: a) a white board with the schedule, b) a white board for writing the key points when necessary (so that they are documented), c) three pin boards: one for the skills list and the progress bar, two for the participants artwork
- A personal storage box was provided for each participant to store their artwork
- To enhance the children´s role as team members, all the participants had name cards
- The printed gamified elements included: points booklets, progress bar, avatar icons and printouts and cutouts of the game elements to create a connection to the final game through the visual similarity
- Craft items, such as markers, coloring pencils, white and colored paper, scissors, glue, tape were also provided
- A pig alarm (squeezy dog toy) was used as an aural cue

Technical equipment used were video cameras, recording equipment, cameras, computers, and the Microsoft Kinect device for game. The space used was Tampere University ´s staff living room in PinniB 1029-1030 which is a playful space with colorful walls, windows to the hallway equipped with couches,

chairs, tables, walls and a screen with a projector. The area of the game screen could be divided by a door within the workshop activity area. Each session had a written plan that included information about the duration, location, participants and the research team. It also included the theme, session specific game design goals and facilitation goals, a brief section of expected results, methods and models used and the type of data and how it was collected. The materials used, technical equipment and the space were listed in the plan. Each plan was followed by a detailed script (appendix 2).

3.3.4 Rapid Idea Implementation

As the sessions occurred weekly, the digital graphics needed to be finished and incorporated into the game before the next session. The graphics were created in vector format in Adobe Illustrator. The ideas implemented in the game were chosen by the graphic designer based on the perceived usefulness and functionality of the ideas in this particular context. The ideas were picked so that each child could identify at least one of their proposals in the game. The graphics were then added to the game by the software developers.

3.4 The Pigscape Game

Pigscape is a motion sensing input device -based (Microsoft Kinect) embodied game (where actions of the body are used to control the game) that engages the player to move physically in space. Computer vision, such as Kinect-device, is used in embodied games to detect the physical motion and transfer it to the computer to control the interface. The Kinect device has offered huge benefits to both education and therapeutic rehabilitation (Altanis et al., 2013). Pigscape uses webcams and motion tracking to detect the player´s commands. It is based on recreational video gaming offering an easy, fun and familiar setting for children. The game requires no special skills or knowledge to play. It incorporates two types of tasks - the main game is an infinite 2D side-scrolling

point collecting game with actions of jump and double jump to collect items and avoid obstacles. Once the player reaches a wall with an image of a posture, they are transported to another minigame. This will be referred as *Hole-in-the-wall*. In this freezing-type game, the player´s task is to change their physical body posture to correspond the graphical posture on the screen. The more parts they can fit in the shape, the more points they get. The freezing tasks get more difficult as the player progresses – for instance, the time for freezing increases. The aim of this task is to create a calm section for the intense main game and to make the player stay still for a predetermined time.

The alteration of active and calm epochs in the game targets the impulsivity and hyperactivity symptoms of ADHD. Physically active gaming increases a general level of arousal of the players, followed by a motionless period in which children need to suppress excessive movement. As the game is played in pairs , two avatars are visible on the left side bar. The players play their own individual game on a horizontally split screen (see Figures 2 and 3). The gaming is co-located and competitive. Children are supposed to see how their peer is performing. When played at the clinical trial, assisting psychologists teach emotion regulation, e.g. not to lose temper when a peer gets more points. The game is intended for children of 7-12 years.

The game prototype was build with stock graphics purchased from GraphicRiver.net, an online marketplace for graphics. Sound effects (currently background music and jumping sound effect) are purchased from AudioJungle.net. Both are royalty free assets with a license allowing redistribution for non-commercial use. Commercial licenses are available if needed. The implementations to the game were done by a graphic designer so that the visual style could be consistent. The main menu and the game logo were also designed by the designer, as well as the postures for the freezing minigame. The game mechanics were designed by the software developers within the research team beforehand. The name Pigscape came from the children's ideas of the backstory, as described in section 4.2.

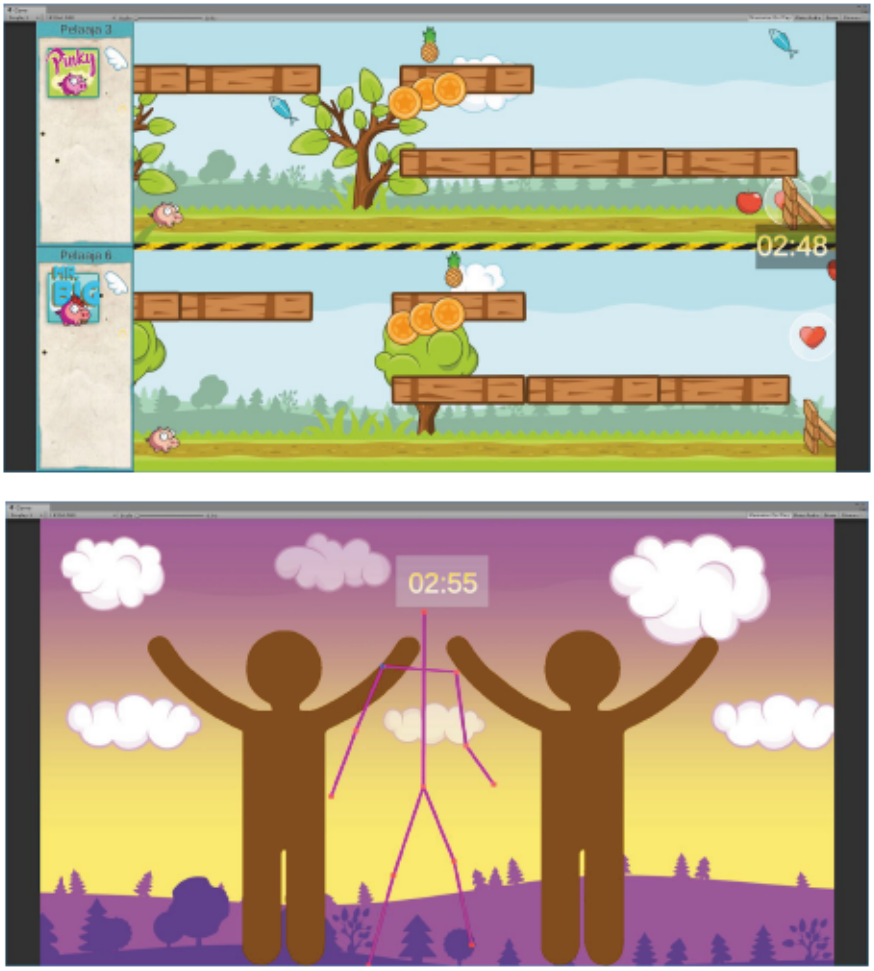

Figure 2. Gameplay screen of Pigscape after the first design session including the avatars *(top)*, Hole-in-the-wall minigame screen showing the postures for the player to imitate and the skeleton that corresponds to the player's movement *(bottom)*.

Figure 3. The first game prototype introduced to participants by the developers *(left)*, example of the minigame´s freezing task *(right)*.

3.5 Gamification of the Workshop

Game elements are key features describing a specific component of a games applied in gamification. These include points, badges, leader boards, progress bars, meaningful stories and avatars (Sailler et al., 2014). In this work, the facilitation goals and game design goals were intertwined (see Figure 4). As gamification has the potential to foster motivation in different contexts (Sailler et al., 2014), some of these gamification elements were used to present the skill-learning (see Figure 5), in a more motivating way as well as to add visual structure, consistency and sense of continuation to the workshop. Name cards were given to enhance the feeling of belonging to the group.

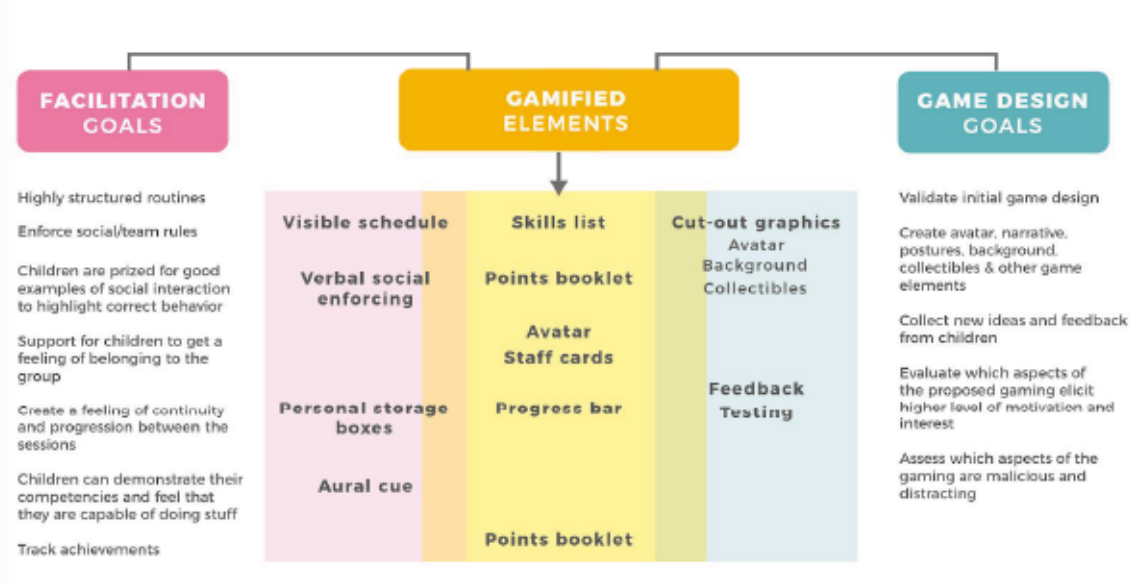

Figure 4. Facilitation goals and game design goals intertwined by the gamified elements.

As in previously mentioned Gennari et al.´s (2017) work, similar elements of gamification were used in Pigscape workshop to encourage the participants to follow through all the sessions. These include the progress bar and points booklets. Progress bars in games are used to show the player´s progression in the game. The progress bar in the workshop was to represent the continuum of the sessions and end goal of getting the final rewards. Progress of the sessions was shown on a printed progress bar on the board (see Figure 6). The pig icon was used as a "badge", where in each session a new badge was received. The

children were given a points booklet where they collected stickers based on their activity and accumulated "points"(Figure 7). The icons represented the skills practised and stickers were given by an observing researcher with an explanation of what it meant.

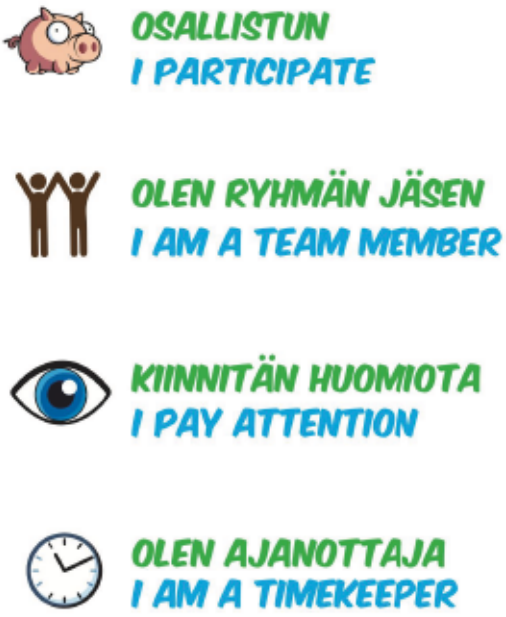

Figure. 5. Printable skills list that was visible on the board and as handouts to enhance remembering the skills. The same icons were used in the points booklets.

Gamified elements were also used in the execution of the activities. These were cut out materials with the Pigscape-game style illustrations and color printed background graphics (Figure 8). With these, the children could draw or glue the cut-out material to create a paper prototype of their ideas. An avatar that the participants created, was digitally enhanced, printed out on paper and given to the participants to motivate them (as they constantly saw their own creation as a game character) and to use in the activities if they wished. Similar materials were used in collecting feedback from children and these along with the used method will be described in section 4.5. After each session that included creative work (pig avatars, narrative, scenery, collectables) the children were shown the implementation of their ideas in the game prototype. In the last session children were given a booklet that summarized the activities and the

workshop with photos (appendix 2). They also received diplomas and movie tickets on the last session ´s "Award ceremony". Session overview is summarized in Table 3.

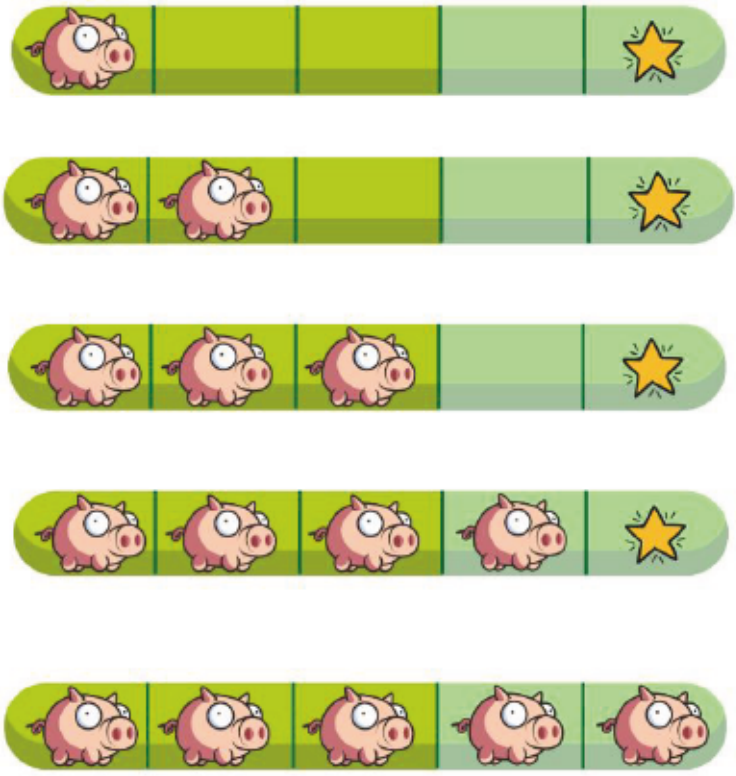

Figure 6. Progress bar presenting the continuum throughout sessions 1-5.

Figure 7. Points booklet with all the sessions completed, participants avatar icon.

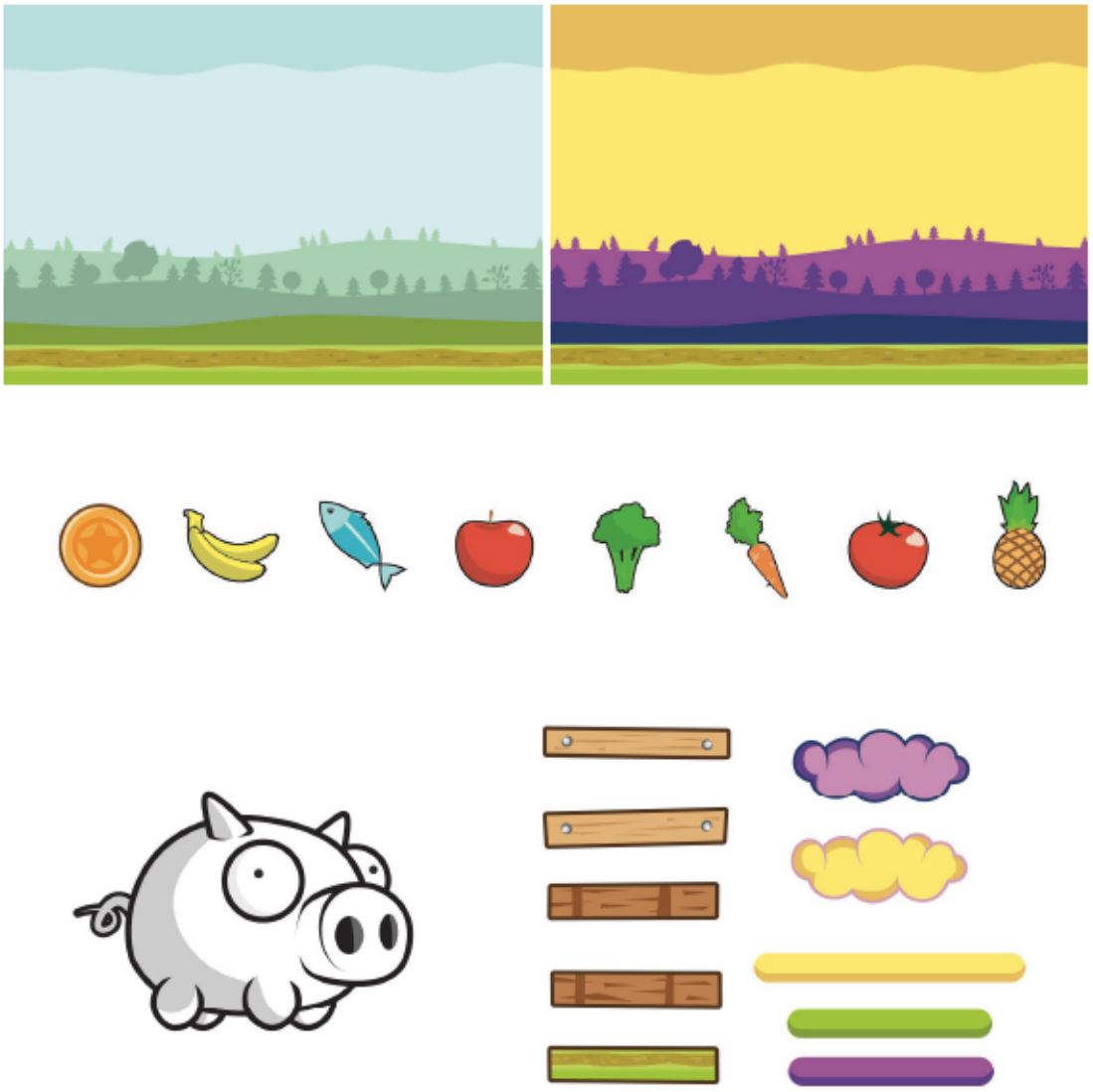

Figure 8. Examples of the printed materials used for the activities: level backgrounds, collectibles, avatar, and platforms.

4 WORKSHOP SESSIONS

This section describes the workshop sessions in detail, based on the script, the notes, observations, and the video analysis. Each session has a dedicated subsection with description of the theme and activities in the sessions with visuals as well as brief analysis on the parts that require further explanation.

4.1 Session 1: Introduction and Avatars

At the start of the first session, the facilitator went through the practicalities and introduced the researchers, the project, and the workshop to the participants and their parents. Introduction to the workshop, researcher, and tasks in the first session required 15 minutes while for subsequent sessions the introduction to the day´s agenda was reduced to 5 minutes. The parents read the written informed consent while the facilitator explained the most important points to children verbally, and the children signed the informed consent as well. After this, the parents were given the option to leave or stay and watch with the encouragement of not to disturb the session. The participants were shown the initial game demo as a game play video on a laptop to help them gain an understanding of what is already made. To get to know each other, the participants were asked to tell their name, one thing about themselves and why they like games. Everyone was provided with a name card, similar to those that the researchers were wearing, where their name would be written. The participants appeared to be shy but all of them were able to share details about themselves. Some told that they like games because they have experience making some in *Scratch*. *Legos* and *Fortnite* were mentioned as games that they play.

The game design goal of the first session was customization of the main character, a pig-avatar, and to create a bond to the character. Fullerton (2014) highlights the importance of balance between the "agency" and "empathy" in game characters. Agency is referring to the function of the character and empathy acts as the potential emotional attachment to it. Therefore, the agency

was defined by the software developers beforehand so the character customization focused on fostering empathy which in turn, was expected to support the aim to create a bond. The theme of the first design session was to create individual pig avatars (see Figure 8). The participants were provided an A4-sized sheet of paper with an outline of a black and white cartoon pig character, color markers and pencils, scissors, and printed out accessories. To validate the value of the participants´ contribution, they were told that their designs are important to make the existing game more interesting and fun. After spending time on creating the avatar and adding accessories to it, participants were asked to pin up their creations on a board, tell the name of their pig and explain its characteristics. Everyone was asked to say at least one thing they liked about another child's idea. This was to ensure that they learn how to practise giving feedback and was connected to the skill "I am a team member". The participants were encouraged to ask questions and give feedback about the designs. The researchers were guiding how to give feedback to others, by using phrases as "I like this, because….". The facilitation goals, the 4 "I´s", were practised and mentioned in a similar manner throughout the sessions.

Figure 8. Avatars created by the children in the first session *(first row)* and the implemented characters *(second row)*.

Most of the participants felt like they did not finish their characters because of too little time. Some children became really attached to their creations and were mentioning their pig character also in the later sessions. The original idea of this activity was to collaboratively choose one character that would be implemented into the game. However, choosing only one, or combining ideas of four characters into one was challenging. Also, the children wanted to have an option to choose which character to play. Based on children's wishes and the research team discussions, the game then ended up having four different avatars that the player could choose from at the start menu (see Fig. 4).

Both children with ADHD were keen to share their ideas. After the presentations, they asked for permission to talk and tell that they had some ideas for the game. They suggested, for example, that there could be hidden boxes that you can find and get the enhancements from. They also had an idea for the hole in the wall -part so that instead of freezing, you could do something else, like jumping jacks. They were acknowledged and given positive reinforcement by the facilitator with comments such as "That´s a really good idea!".

The ADHD children were good at paying attention after being instructed to do so, i.e. not interrupting when someone is speaking. ADHD children were notably good at keeping track of time and reminding the researchers if time was up. The neurotypical children were calm and followed the instructions without interrupting. At the end of the session, the participants were asked what was fun. They answered that it was making up the avatars, coloring and snacks. They were also asked if they learned anything, all of them were a little hesitant and said no. This question, however, was possibly too early for the children to answer after only one session.

4.2 Session 2: Postures and Narratives

The participants were shown how their previously created avatars were implemented in the game. The children were shown a demonstration of the game in action and took part in playing it. Everyone individually tried the

current postures in Hole in the wall -game. While one child was playing, there was a conversation among the others where the participants were asked about their experiences on active games – games that require moving physically in space for interaction, for instance, dancing games played with Nintedo Wii. They were asked if they had played active games before and if these kind of games fun and why. All of the participants had experience playing active video games, mainly on Nintendo Wii. All of them thought these kind of games are fun, especially watching others while they are playing.

Figure 9. Testing the existing postures (upper row) and creating new ones (bottom row).

The first workshop activity, where children were making up postures, was slightly challenging to get started as they seemed to be too shy at first. This improved after the researchers showed an example. Mainly the children were

trying to do too "crazy" and difficult postures (Figure 9). They were then instructed to create postures that all of them could hold for 30 seconds, i.e. that the postures needed to be easier. This might have caused disappointment since most their ideas regarding this were not suitable for the game as the postures they suggested were too difficult to hold, or even perform, for the required 30 seconds or longer. The second workshop activity was aiming to create the backstory for the pigs: *What is the story of the pigs; why are they running? Where to/from are they running?* The children individually created their own stories for their pig (Figure 10). They were given the option to draw, write, or use the cut out materials, but all of them chose to write down the stories. A similar theme was existing in all of their narrative: the pigs were escaping.

Figure 10. Creating the stories.

Summary of the stories created by the participants:

1) A farmer was going to sell all the animals from the farm: pigs, cows, chickens and sheep. Each species were put in separate cars and they had their own ideas of how to break free. Only the pigs got out because they were the smartest ones.

2) The pigs are escaping from the butcher to their friends. Once one gets in, another starts running. The farmer is only chasing one pig, you have 3 lives.

3) The pig "made some birds angry" and is escaping from them. He is running towards to the sea to get on a ship. While he was running, he bumped into cans of paints that are not coming off of his skin, thus the rainbow color of the avatar (see Fig. 8, Vigi).

4) The pig is escaping from the angry farmer to the pasture.

The stories were entertaining for both the researchers and the participants. All of the children were familiar with the concept of a butcher i.e. that pigs are killed for food. The pigs would be running away from the farm so that the farmer would not kill or sell them. One participant had been wondering if the butcher theme would be too dark, but since all of the stories were revolving around the same theme, it can be concluded that it was not – at least for the participants. The ideas were clearly representing the creativity that children have. A lot of the ideas that they shared were amusing for the others as well. This would indicate that children do appreciate similar ideas as other children. **The backstories were implemented into the demo by naming the game "Pigscape"** (see logo on Figure 11) since all the children had similar ideas of the pigs escaping from somewhere which would create the atmosphere for the game.

In the end the stories were discussed together: each participant told their own story to everyone else. The children were overall more open and talkative in the second session. Creating the stories was seemingly fun for them and they were also discussing with each other as they were doing it. The facilitator was asking questions about their stories and the children liked to talk about their ideas. The participants were asked to say one thing they liked about another participant´s story and were giving positive feedback to each other, one person gave feedback to another and then vice versa. The feedback was instructed to be given in the form of "I like this, because…". Children engaged in conversations

and were giving feedback about the work. As they were shown a graphic designer´s implementation of their character this time, they were also discussing about each others pigs and giving positive comments even though some ideas presented on the implementation were not the original ideas (for example one pig had accidentally another pig´s name). The children thought that these "mistakes" could be actually better and the name is more suitable to another child's work. One child spontaneously started giving ideas how the stories could be combined, another child joined the discussion enthusiastically.

The children were more relaxed, active and talkative as compared to the first session. They were taking part in activities, shared their ideas and kept track of the schedule. One participant was notably excited about seeing their avatar on the screen and was also mentioning the avatar´s name repeatedly. This verifies that a bond to the game character was created. The children with ADHD needed a reminder from the facilitator (with a gentle touch on the shoulder, eye contact) to not talk while others are talking. They were constantly glancing through to see their character on the wall, seemingly excited to talk about their own ideas. Children liked to see their work put up on the wall for themselves and others to see. One participant was diligent about the schedule and in the end of the session was non-verbally signaling the facilitator about the time running out, but did not interrupt by talking. When there was no reaction, they raised their hand and waited until the facilitator noticed and gave permission to talk. They mentioned the time and the facilitator gave positive feedback about this reminder. Within the session, it was shown the participants had learned what they were instructed to do in the beginning - to not talk and interrupt when others speak and wait for his turn.

One participant was keen on sharing their ideas for the game levels (pigs could go around the world, levels could be glacier, desert etc.) even though these were not discussed yet. After the narrative workshop activity, they were seemingly worried that they did not finish their story. Observation also suggests low self esteem on the child when they are unable to complete tasks; a lot of explaining was done on why the work is so "bad" from their point of view. They were continuing to write the story when others were giving

feedback. They had a hard time listening to the story that they needed to give feedback to, were more focused on their own work and wanted to finish it after the session ended.

Figure 11. Avatar selection screen in the main menu after iterations. Player 1 and player 2 can choose from four different characters. The orange bars indicate a scoreboard, where the children could see points by the players who had been playing the game. Pigscape -logo was created after the escaping-theme was established.

4.3 Session 3: Scenery, Collectables and Obstacles

Session 3 activities were focusing on enhancing the environment. This would entail designing the scenery, levels, obstacles, and the collectables; things that the character would collect in the game world. Children were given craft items (colored pencils, markers, paper, scissors, glue) and pre-drawn material to start working with. These were such as colored A4 prints of the background graphics, ideas of icons to collect (apples, bananas, coins), and cut outs of the obstacles. In Activity 1, the participants were asked to think how the scenery in the game would look like and were encouraged to use some of the ideas that they already had come up with in the previous session. At the end of the activity each participant pinned their artwork on the board, presented it, and then it was discussed with the group – the participants were encouraged to give

positive feedback in a form of "I like this, because…" and negative by formulating it like "but I feel like….". and were able to do it in this manner. In Activity 2, the participants were asked to think about what the pigs in the game could collect and what would happen after that. They were also asked to think if the pig would get some kind of superpowers and what kind of obstacles or platforms to jump on there could be in the game. In the end of the session, there was a wrap up discussion and the participants were told what the next session would entail.

Figure 12. A participant is using the precut material to communicate their idea of how the platforms could be used as obstacles. A paper version implementation of their avatar can be seen on the left of the artwork.

Having some already made ideas, such as the pre-drawn collectibles, helped the participants to understand quicker what they are supposed to do and they were good at taking forward the idea that they had on the material. For example, different looking platforms could have different characteristics – they could be bouncy or slippery. Furthermore, the platforms could be used as obstacles (Figure 12). Fruit and other food items were shown, which got them into creating features to the collectibles. One idea for instance, was that instead of

only collecting different items or elements, the amount of a specific element collected would also give a superpower.

Figure 13. Workshop set up on session 3. Similar setup was used in all of the sessions. The participants and the researchers are gathered around a large table where the activity materials can be seen. Personal storage boxes, where children stored their artworks and other material throughout the sessions, are on the table. Video recording setup can be seen in the front area and the boards with pinned up artworks are on the background. Behind the boards the room could be split by a wall between the game screen area and the workshop activity area.

Summary of game ideas developed by the participants:

The pig could get into a grill and there would be fire and burning coal. The pig could collect screws so that the grill would fall apart and collapse so that they could escape from it. In line with the idea of the pig running around the world, the levels could be themed as for example a desert, a glacier and a jungle. There could be thunder and rain which would bring water on the ground affecting the pig´s movement. The pig could also swim or they could be running in a school and then the obstacles would be tables and other classroom furniture. There were ideas of bouncing platforms or using platforms vertically to create

obstacles and a cloud that can be gone through only from the other side. Instead of collecting things and gaining something from them, the player could also lose one life by collecting a skeleton. The participants also mentioned that there should be some way to die, for example lowering a full bar of energy, and then collecting fruits and vegetables would increase the energy levels. Collecting bananas would give banana feet, which you could use to walk on hot coals. By collecting coins, items could be purchased at the end of the level. Ideas that were implemented to the game were the grill level (Figure 13), glacier level (Figure 14.), gifts, platforms, apples, special item (heart in a bubble), bigger coins, game menu, avatar selection and a score board.

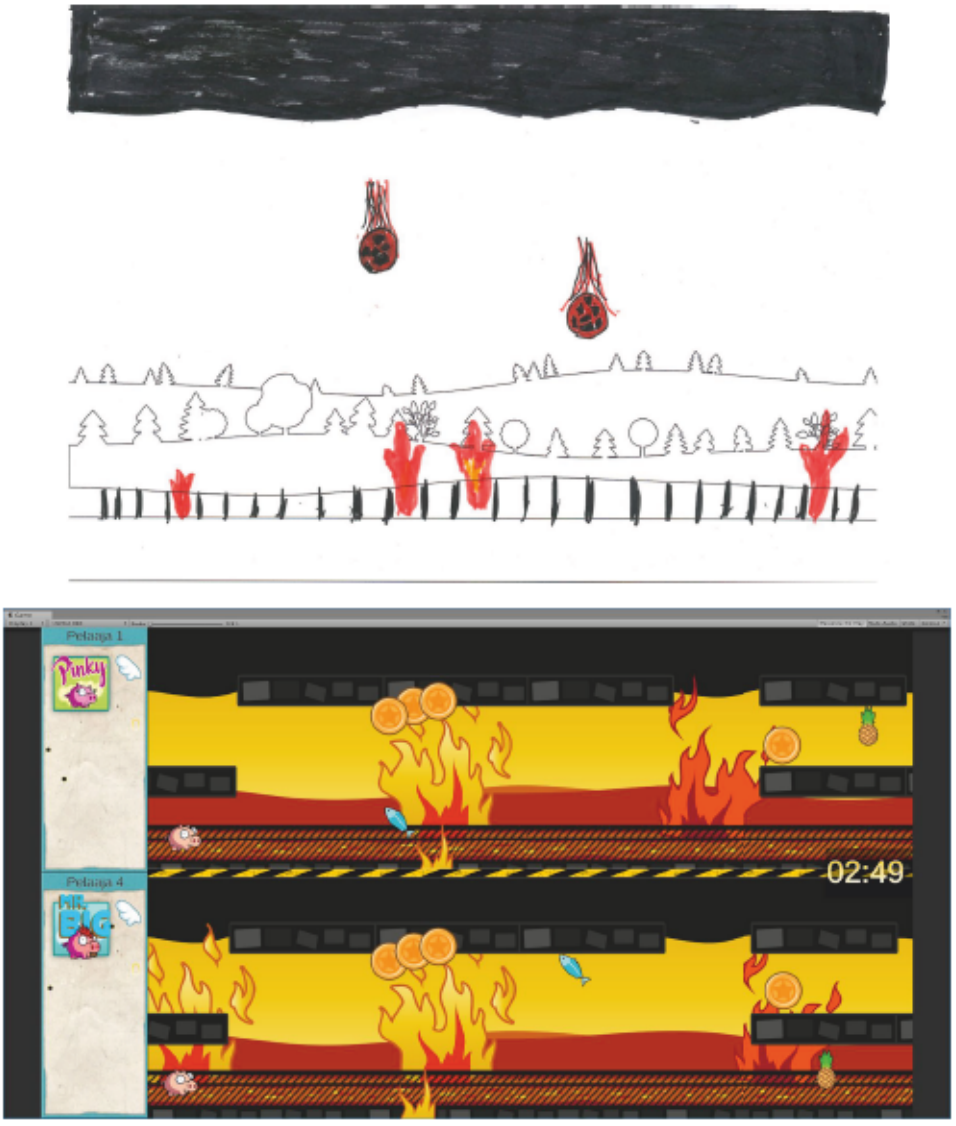

Figure 13. The participant´s idea of the grill level implemented to the game.

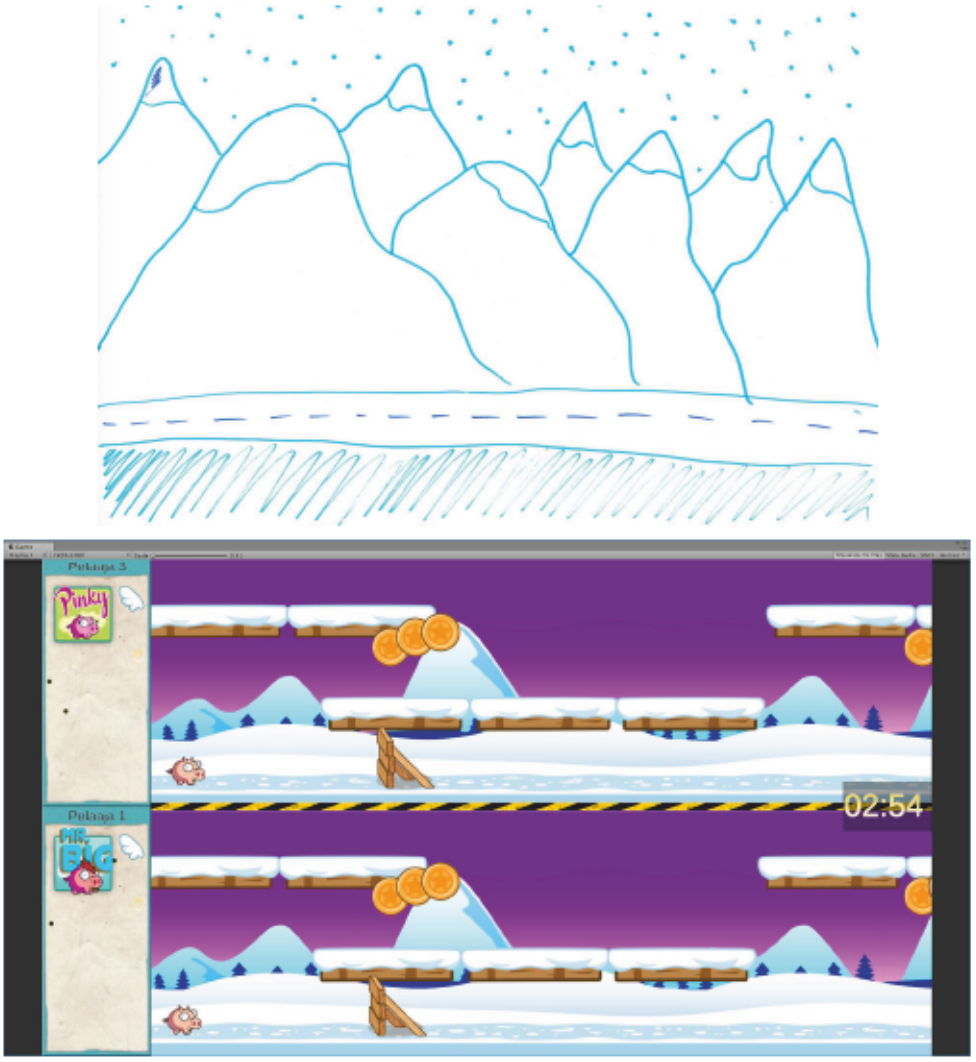

Figure 14. The participant´s idea of the glacier level implemented to the game. Chosen avatars can be seen on left.

The participants were good at taking part in the activities and there were spontaneous discussions with idea sharing. Activity 2 would be done collaboratively and they would work in a group together. All of them had improved in the skills that were practised; they were waiting for their turn and would not interrupt; they all shared something at least once; they were giving feedback in the taught manner: comment on each others´s work politely and give suggestions for improvement. At the end of the session the participants were asked what they learned today. In this session, the answers were "I am a team member", "teamwork", and "paying attention". They also might have

answered this way because maybe they thought that these answers were expected.

Compared to neurotypical children, the children with ADHD asked questions actively, talked and interacted more and were not as shy as earlier on in the sessions. They were having ideas already for an activity that was not started yet and seemed to get very engaged in the activities. When children were sharing their ideas, they were given supporting comments by researchers such as "Good job!". Overall in this session, children were mainly quiet and focused on the tasks. One participant was explaining how they got an idea from another participant´s idea. Some of the participants drew inspirations from the workshop materials. All children were capable of building on existing ideas and taking them further.

4.4 Session 4: Game demo and Feedback

As many of the children´s ideas were implemented into the game demo at this point, this session focused on testing the game and also gathering feedback from the participants about the workshop organization. It was emphasized that the game is still in development phase and might not work as intended and why it was important for the child participants test it out before the clinical trials. For instance, it was revealed that in the part where the pig was jumping there was a delay in registering the movement. The participants enjoyed seeing their ideas in the game and were discussing their characters.

The game developers showed the game. It was noted that children should be clearly demonstrated or instructed on how the system works and told its limitations, for example in this case that the game is only a prototype and might have a few bugs. This was to set their expectations and to make them aware of the testing process, which is also in line with the PD aims. The participants were explained that the functionality of motion tracking is being tested and their help is needed. This way they will see many things that needs to be done in the game development process.

All the artwork was displayed on the board (Figure 15) to remind the participants of the previous three sessions and their designs in each. This was used to elicit feedback from them through individual interviews and through the group discussion. The participants presented one by one their work done during the previous sessions while others gave feedback. The facilitator was giving feedback to the ideas and was moderating the discussion. The participant´s way of providing feedback had improved and they were able to independently use sentences such as "I like this idea, because…" The participants also gave feedback about the workshop: what were their favourite activities and what they had learned. The answers included comments such as "teamwork" or "not much".

Figure 15. Artwork displayed on board, presenting and giving feedback to others.

4.5 Session 5: Feedback and Award Ceremony

The fifth and final workshop session was relaxed and focused on getting feedback about the organization of the workshop with a new method. In addition, of interest was to acknowledge children's work and their contribution

to the project. Activity 1 had a duration of 20 minutes that was split into two 10 minute slots. The two children played for 10 minutes while the other two provided feedback to the researcher for 10 minutes, and then the activities were switched. The children tested either the new grill level or the glacier level (Fig. 16).

Figure 16. Children test their own created grill level in pairs.

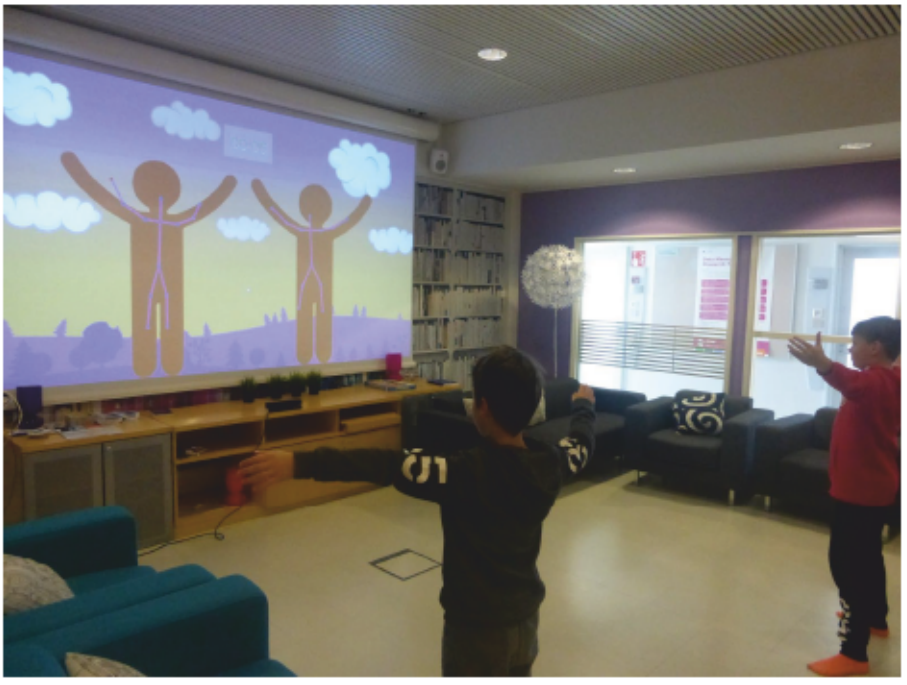

Figure 17. Children test the improved postures in pairs.

The grill and the glacier levels were implemented to the game based on the children´s ideas from the previous workshops. In the feedback activity, the participants were asked to think about the workshop and all that was achieved. To collect feedback from them, they were asked to put cut-out icons on a timeline made of five large paper sheets, that represented each of the sessions (Figure 18). The objective was to use a similar tangible technique as previously used to create game elements, to now collect feedback about the workshop and the activities. To help remember what happened in each session, corresponding pages (Figure 19) representing photos and icons from the session were printed out and placed on each session´s spot. A background image was printed to represent the room where the workshop was conducted. The participants were asked to think about what they had collected: let it be e.g. ideas, candy, sandwiches (Figure 20) and also the "obstacles" that they encountered to represent what was considered difficult. They were asked to put the good things on the top section and the not so good or challenging things on the bottom in order to express how they felt about each session. The children could also to use and modify emoji/smiley -icons to represent their emotions regarding the session or the activities. The icons were created based on their previous interview answers and discussions, and the activities on each session.

The participants were using *think aloud method* (i.e. talk while doing the activity) to express what they thought. For instance, one child was putting on an icon of a lightbulb on the top section while saying: *"I had a lot of ideas"*. Some of the key quotes were written on the paper by the facilitator. Children took a while to think before they started adding elements on the paper and were instructed in other words if it seemed that they did not understand. They asked questions e.g. *"What is this?"* and were provided an answer by a researcher. One child added a star icon: *"This is from the time when I got an extra star"* (referring to a bonus sticker for the points booklet). Eventually all of them got the idea and were able to independently make connections between their feelings about the workshop activities and corresponding paper icons. This seemed to be a working method for children to express their feelings about the workshop and was bringing up the things that were memorable for them. Even though this

method helped to gather more insightful feedback, it could be improved. While being a promising concept, the improvement would require further investigation and iteration.

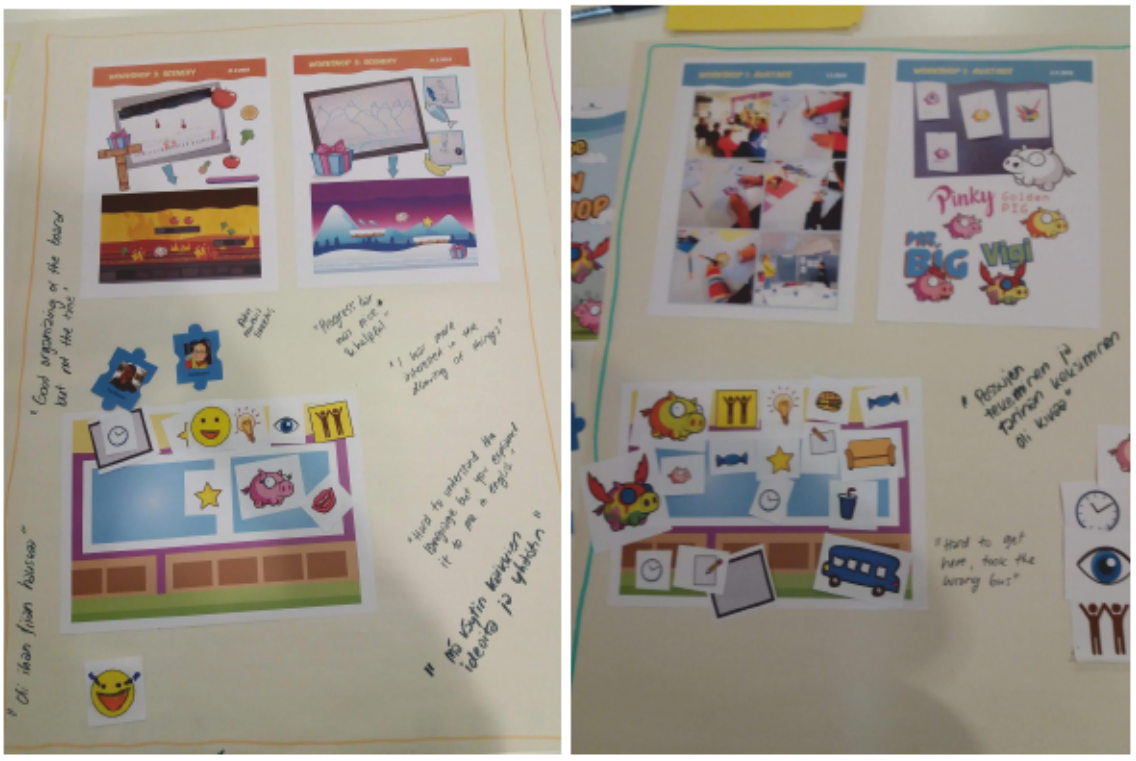

Figure 19. Feedback activity. On the bottom left, a happy emoji icon was independently enhanced to express laughter with tears as some activity was considered "too funny" so it became an obstacle.

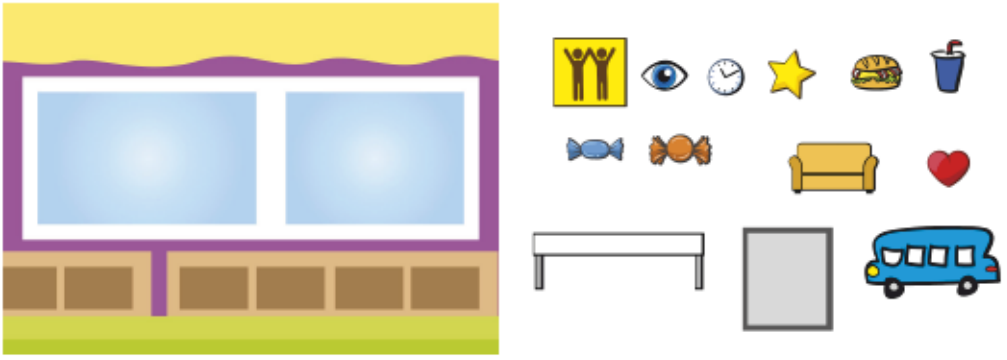

Figure 20. Printable "level" background (the workshop room), collectable and obstacle ideas for workshop feedback.

Activity 2 was the same feedback idea as described above, but now it was continued with all of the participants together. This was done not only to gather more feedback but also to incorporate more group work into the

workshop. Closer to the end, the children were giving more feedback also verbally – some more, some less. Once the children understood this method of collecting feedback, they were adding more icons into the session sections. The first session where the pig avatar was created had the most icons. Based on the feedback gathered with this method, the participants had fun and they liked the workshops overall and the activities were enjoyable for them. When asked how to improve the workshop, all of them agreed that the time was too short. They would have liked it to last longer so that they could have continued the activities more.

The workshop ended with an award ceremony (the last session was approx. 15 minutes longer than the previous ones). The children were seated comfortably on a couch and some parents were present. Final words and thank you ´s were said by the facilitator and the team. Each child was called out by their name to come up, shake hands and get their diploma and the memory book along with movie tickets. Once all of them had their rewards, a group photo was taken. Children were seemingly happy about the diplomas and the movie tickets.

This section discussed how the workshop sessions were executed. Here, I described all the five workshop sessions in detail with visuals. The themes and the activities in them were explained and behaviour of the participants were mentioned when relevant.

5 FINDINGS

This section discusses the overall findings and challenges of this study that were briefly mentioned in section 4. The data is gathered from multiple sources: the artwork from children, feedback from children, facilitator field notes, psychologist observations, video recordings and images. The data is discussed in subsections organized as the game design goal outcomes, facilitation goal outcomes, and the feedback from children.

5.1 Outcomes of Game Design Goals

All artwork was gathered during the first three sessions and was themed around design. This included the avatars created by each of the participants in the first session (shown in Figure 8), postures for the Hole-in-the-wall mini game and written narratives on why the main pig was running in the second session (shown in Figure 9), and the design of the levels through different backgrounds and collectibles or elements in the game that gave the avatars special power in the third session (shown in Figures 13 and 14). For example, as shown in Figure 21, the pig would get superpowers by collecting fruit and the amount of fruit would be a deciding factor in the strength of the superpower. This idea was developed first as pairs and then in a group in the third session. The team work was free flowing and not forced, however, from the subsequent sessions, there were parallel activities in pairs (game testing, feedback collection), thus, the time spent on teamwork was further reduced.

Another example of the artwork and narration created by participants (Figure 22) is of the avatar named Vigi and its corresponding story: *Vigi is escaping from angry birds and is trying to board a ship so they can run away to the sea. He has a weird color because he bumped into cans containing permanent paint. He has wings found from a superbox.*

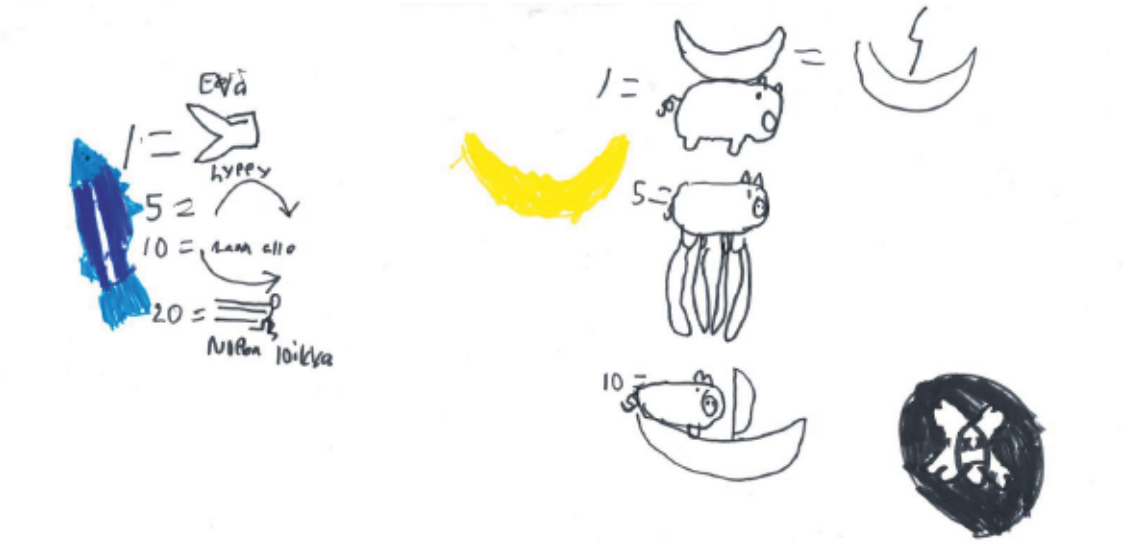

Figure 21. Ideas developed in a team – the pig would get superpowers by collecting fruit.

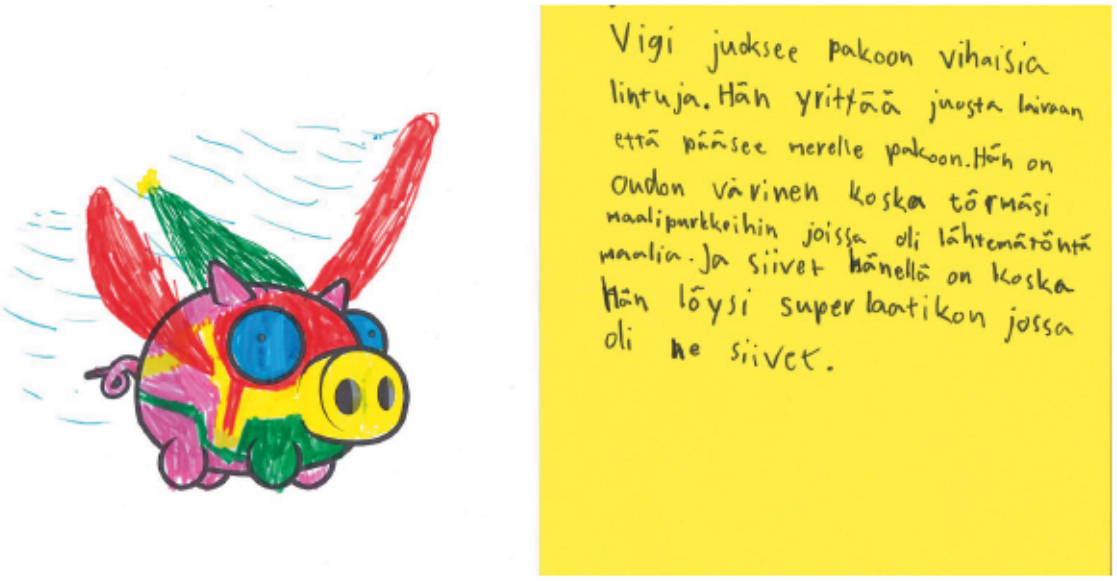

Figure 22. One example of the avatar named Vigi and the corresponding story.

Several methods were employed to elicit feedback from the participants, including, drawing and coloring, cutting out printed accessories and gluing them, and free-hand writing. There were also a few brainstorming sessions where participants worked in pairs or as a team. Out of all the methods employed to elicit design artifacts from the participants, each participant enjoyed a different activity (creating avatars, the background, collectibles or the narrative) as they mentioned when interviewed in the fourth session. There was

no one clear method that was preferred. Thus, having multiple methods worked well. Further, seeing their artwork - avatars, backgrounds, collectibles, converted into the professional looking game element and being incorporated in the game was also met with great enthusiasm as observed by the facilitator. At least one participant would mention their avatar repeatedly during the sessions. The ideas generated during the sessions were also sometimes shared with the parents back home. The game design goals and related issues and improvements are discussed next.

Goal #1 Validating initial game design: The workshop mainly focused on the visual and narrative elements of the game. Other aspects of the game design included on-screen instructions and rewards. These had to do with point collecting and the scoreboard to compare with other players, which was noted to increase the motivation to play the game. The children were able to build on top of the underlying game prototype.

Goal #2 Collecting new ideas and feedback from children based on their "gaming expertise": To gather ideas for the game from the children, customization of the main character was intended to create a bond to the character. Hence, it would increase the motivation to both continue through all the sessions and to be engaged in rest of the design activities. As expected, the character customization and naming did create a bond between a participant and their pig character. Instead of choosing only one avatar to be implemented into the game, all four were added. The participants suggested that it would increase the interest in the game if the player could choose the avatar. Against the expectation of the idea of the pig escaping from a butcher being too "dark" for children, based on the observations and children´s own opinions, the existing prototype with the theme of the pigs escaping was suitable for school-aged children. The children were able to partake into the process of creating postures to the game with the researchers and created interesting backstories for the pigs. The children came up with ideas for the levels and environment including hidden boxes with superpowers, obstacles with added features and collectables. From the perspective of validating the initial game

idea, children value funny things, but they also appreciate logic and continuation. Based on the ideas they shared in the design activities and by collecting points to their booklets, rewards are important. Children liked to be the ones deciding how things would work, e.g. game mechanics. As they probably draw these ideas from other games, it is still important to let them feel like the ideas were theirs. Children also like the challenge - one comment to another child's work was that they liked that the collectable "gift" was in a difficult spot.

Goal #3: Evaluate which aspects of the proposed gaming elicit higher level of motivation and interest

Seeing their own ideas implemented on the game prototype was motivating for the children. Children had multiple suggestions for the game mechanics to make the game more interesting. Troubleshooting and testing are an important part of game development to ensure good play experience. Even though this workshop did not focus on game evaluation itself, seeing the children try the game prototype provided insight about playability and other game issues. The gestural controls were tested with the participants. Their participation revealed some software bugs and concerns that would need addressing before releasing the final prototype. For example, the commands were not always detected by Kinect and there was a delay between the player physically jumping and jumping of the game character on screen. Also, the participants could not easily fit into the proposed freezing positions which affected their scores. However, the issues with Kinect causing the skeleton shaking inside the posture was amusing for the children and they did not mind too much if it did not work as planned.

5.2 Outcomes of Facilitation Goals

The main goal of the workshop was to provide therapeutic training within the participatory design sessions instead of only having open play or open design. To realize the therapeutic training, the four I-statements were devised. Even

though there was a noticeable change in the behavior of children with ADHD, regarding their interaction and participation in the workshop over the sessions; it is difficult to comment on whether the changes or improvements translate outside of the workshop environment. The facilitation goals and related issues and improvements are discussed next.

Goal #1: I participate: The children with ADHD needed reminders to not interrupt when someone else was talking. Some typical ADHD behaviour was recognized in both of the ADHD participants during the sessions, for instance, not staying still, overly concentrating on something and not wanting to stop even when asked to, talking a lot and being diligent about the schedule. The interruptions reduced in subsequent sessions and after the children were being reminded of it.

Goal #2: I am a team member: The main challenge with team work was that one participant was an English speaker while the others were Finnish speakers. This reduced the amount of interaction between the children. Although the children were discussing together about their work, the English speaker was not able to take part as much as they would have wanted or that would have been ideal. It was noticeable, however, that the Finnish speaking children were trying to include the English speaker as well and everyone was polite and considerate towards each other. As a lot of the ideas had similar characteristics, thus, one specific idea was not needed to be chosen. Collaborative choosing of ideas, such as voting, was dropped because the children were already open to discussing how to converge their ideas, or that most ideas had a common theme or characteristic, which given the positive rapport the participants shared, was easy to build on collaboratively. The ideas chosen for the final game were done so that each child´s contribution could be visible to them. The ideas were something that could be easily implemented to the current demo and were chosen by the facilitator based on the clear favourites in the discussions with the participants.

Goal #3: I pay attention: Throughout the sessions, children opened up and could answer what paying attention means in this context, e.g. being quiet

when others speak and not interrupting. This was also noticed when listening to the instructions.

Goal #4: I am a timekeeper: Children understood and were very diligent about tracking time. They were keeping track even if it was not their assigned responsibility. Children acknowledged the pig alarm and were recognizing its meaning. The sound of it was not too loud, intimidating or distracting but still noticeable.

5.3 Participant Feedback

To understand how the children perceived the workshop and the activities in it, sessions 4 and 5 were aiming to collect experiences and feedback from the participants. In order to investigate whether there are differences between what children think and what could be observed by their behaviour throughout the workshop sessions, there were three methods used to gather the feedback. First, the children were asked questions by the facilitator all at once in a form of group conversation where they could freely express their thoughts. Secondly, as it was suspected that shyness or other personal factors might affect the participant´s answers, they were also interviewed one by one. In these interviews, the children were asked to fill in a form and were also interviews individually and in addition to answering verbally, they could express their feelings with a smilometer (Figure 24). Thirdly, expecting to gain more detailed and honest insights, a gamified method (described in detail in section 4.5) was used. The idea was to let the children express their thoughts by their own chosen method without possible stress that the interview situation that could create. In the group discussion, the children were asked the questions listed below:

What things do you remember from the previous sessions? (specify)
What was easy for you?
What was difficult for you? What was the most fun? What was boring?
What do you think about the amount of time we had?

The Skills: I participate, I am a team member, I pay attention, I am a timekeeper.
Were they easy to understand? If not, why?
Were they easy to follow? If not, why?
Did you improve your skills during the workshops?
Would you recommend this kind of workshop?
Would you tell your friends about it?
How could we improve the workshop?

When asked what was fun, each child preferred a different activity but overall they all thought that all the activities were fun for them. They considered the only boring part as being when they had to wait and listen to instructions in both languages. All of them agreed that there was too little time for activities. The four I-skills were easy for the participants to understand and follow. They believed that at least their team work skills improved. According to one participant, a challenge in team work can be if others do not like their ideas. All the participants would recommend the workshop and tell their friends about it. The improvements suggested related to the time: the children would have liked both the individual sessions and the overall workshop being longer.

The researcher conducting the one on one interviews with each participant followed a form with questions (listed in English below) and individual sheets of paper for the child to mark how they felt about each of the skills using the smilometer scale (Figure 23). Questions on the form were:

What was the best part of the workshop and what did you like the most?
What was the worst part of the workshop? What did you like the least?
How easy / difficult was the workshop?
Was it easy to understand how the workshop could be needed?
Did you feel that time was flying or did you feel like it was taking too long?
Would you want to participate in the workshop again if you had the chance?
Would you tell your friends about this workshop?

Again it was prominent in the answers that all the activities were enjoyed by the participants. One participant mentioned that they could have stayed on the session "even for 5 hours". All of them thought that time went by fast and they would have liked the sessions being longer. As can be seen on the diagram (see Figure 24), the children felt they positively achieved the skills.

Figure 23. Example of a participant´s answers *(top)*, smilometer icons with the corresponding numerical value *(bottom)*.

When collecting feedback as an activity in session 5 with the new method, the participants were given time to think and look at the sessions as a whole with visual cues. These tangible cues were created based on their interview answers from the previous session, such as icons of a light bulb for ideas, candy for snacks or a mouth for language. This was intended to increase their interest in giving feedback about the sessions and the activities in them. As they did not need to sit still in front or next to an interviewer and were able to refer to an image while they talked, the explanations they gave were perhaps more descriptive. This should be taken into consideration when interviewing especially ADHD children as they might have trouble staying still.

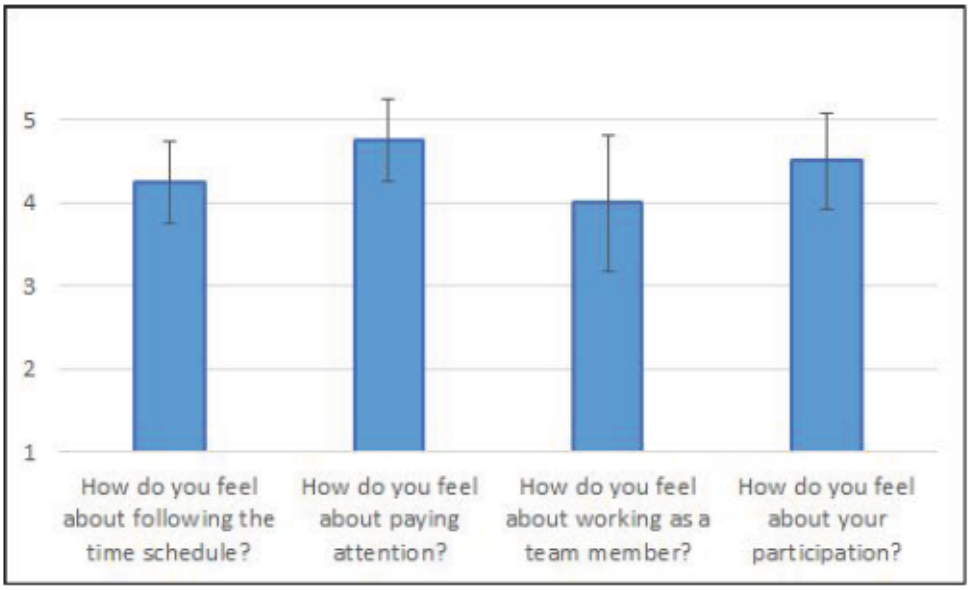

Figure 24. Average ratings and stand deviations (error bars) of how the participants perceived their performance on the Four I-skills.

When there was no guidance in questions, the participants would bring up the topics or issues that they either remembered or were important to them. Instead, when they had something visual and physical in front of them to refresh their memory, it was easier for them to express their thoughts and for the researchers to understand what the children meant. For example, there was a comment *"Progress bar was nice and helpful"*, which would verify the intended purpose and functionality of it in the workshop and that it was considered being helpful. Comments regarding the activities included describing them as fun. Another comment regarding the methods in creating the artefact was that *"I was more interested in the drawing of things"* which again supports the claim that for children it is important to choose how they express themselves. There were also spontaneous suggestions to improve the game itself. For example, one participant commented that *"Just jumping is boring"* and added an idea, that if the player runs the pig goes faster. One comment was connected to an icon of a clock and the explanation was: *"Good organizing of the board but not the time"*, referring to the visible agenda and that timekeeping did not always succeed. One participant commented that they used others ´ ideas and combined them. This was interesting, because it reveals something about the creative process and how ideas, a relevant factor in game design, are formed. The children liked

all the activities, snacks and candy, and trying out the game. Difficulties or negative aspects were related to getting to the University by bus, the game being slow and use of two languages. When the children were given points booklets with all the session pages, one child noticed that they can compare their points and see how they had improved.

5.4 Design Recommendations

Based on the participants feedback, observations, and the overall execution of the workshop, next I will discuss and suggest guidelines regarding organizing PD workshops for ADHD children. I will summarize how to include gamification and EXAT-based strategies into a workshop and also take into consideration how to include both neurotypical and ADHD children in design work. I will split the recommendations into two categories. First, I will discuss the structural recommendations and second, I will provide recommendations for future PD workshops.

5.4.1 Workshop Structure

Having a highly structured program allows the children to train to become more efficient in conducting tasks and achieve high-level goals (Barkley, 1997). In the Pigscape workshop, the structure within the one hour session was found to be functional. Splitting the hour between introduction (10 mins), activity 1 (20 mins), break (5 mins), activity 2 (20 mins) and the wrap-up (5 mins) worked well. Regardless of the actual duration of the workshop, one hour or more, a similar segmentation is recommended. The proposed structure is adaptable yet clear to follow for both the people conducting the workshop and the participants. As routines are significant for children with ADHD, this type of structure supports it.

5.4.2 Guidelines

As a result of organizing and running the workshop sessions, by observing the participants and collecting their feedback, I will provide a list of guidelines on how to practically organize workshops with children with ADHD, with the aim to help take future research in this area further.

1) Create a structured program and a visible agenda to provide long term and short term goals reminding children what they have done and what they still need to do. Having a structured program with fixed and achievable goals is recommended with added flexibility in case things do not work as intended. In this work, this was taken into account and presented with the facilitation and gamification goals. For example, short term goals can be shown through agenda on the board and having a dedicated person as a timekeeper to cross out the activities which have been done. This is also a physical activity which can increase engagement to follow the agenda. Long term goals can be shown to provide the overall idea of the structure. For instance, a progress bar is a good way to show the continuum of the sessions with an end goal.

2) Separate the workshop from the school environment. Despite the convenience to organize workshops with ADHD children in a school or as an after class-activity, it is recommended to put effort into finding or creating a new space (at least move the furniture to create an impression of new environment) for the activities. A playful space, with colors and elements clearly creating the impression of fun, and distinguishing it from a classroom environment, can help to create the sense of freedom and set the participants´ mind into more creative mood. Have simple and clear rules but do not force them, allow children to present that they know how to behave and acknowledge good behaviour. In case there is misbehaviour, children with ADHD can be noticed for example with eye contact, mentioning their name or with a touch on the shoulder.

3) Allow freedom to choose between different methods to complete the same activity, for instance drawing, writing or coloring – and also how to participate, for instance where to sit or to eat while listening. This is important because it supports children's individual strengths thereby allowing them to create and express themselves without being forced.

4) Keep instructions short and simple, since children can have hard time listening when they are waiting for the "fun" part to begin. For example, the necessary administrative parts, such as giving feedback, filling in forms or listening to the instructions could be combined with a fun activity of some sort. In this work, this was done by collecting feedback from the children in a form of a gamified activity.

5) Balance between time and activities. In this work, one hour of duration was later agreed as not being enough time for these kind of creative workshop activities that require mental warming up and coming up with ideas. Thus, it would be recommended to have longer sessions, for instance two hours. Having enough time for activities, especially creative ones, allows room for children to be creative together. Adapting to the situation is valuable in this kind of idea creation since the children were engaged after warming up.

6) Speak the children's language, find a way to support their characteristics and **let them choose**. Encourage ADHD children's creativity, which is also recommended in the D4D framework regarding neurodiverse children (Benton et al., 2014), by having multiple tools to do the same activity, by giving them enough information in multiple formats so they can choose the one that works for them and allowing children to express themselves with their own chosen method. Generally, children with ADHD like the same things as typically developed children. However, they might face challenges doing things in a similar way. To ensure the positive outcomes of activities for children with ADHD, it is important to support their strengths and not punish them.

7) Make it fun - use gamification as a motivation tool. In this workshop it was notable, based on the participants' comments and ideas, that children like to

collect things, gather points and have a challenge – but they also like to win. As children are familiar with games, combining activities with playful approaches, such as using elements of gamification, can be more motivating. It is important that the activities in the workshop are suitable for children of the desired age group. In the workshops, the children liked the activities and their participation was collaborative but the game was competitive. This way, the children were allowed to experience both teamwork and individual input.

8) Have only one working language, if possible. However, having bilingual sessions might be beneficial in case if children are learning a second language. In this work, it was taken as a limitation but there is a possibility to explore how this could actually be used for providing a safe environment to practice speaking a new language. For example, the working language in the field of game design is English. In Finland, young children are already being taught programming and computer skills in school. Thus, they could get introduced to game making with a workshop like this conducted in English with the benefit of learning a foreign language.

9) Roles should be clear. Organizing a workshop like this requires multiple people to ensure success. Each researcher should have a specific role; not so that the facilitator is also in charge of notetaking and observing. Roles should be clear, divided, and balanced. Include a backup role for everyone. For example, in some of the sessions the video recording did not work and it would have been beneficial to have another person in charge of it. The children's role should also be clear for them; what is expected of them and to what extent. For instance, when in the role of a design partner (see Druin, 2002), the children are considered equal with the team. In this work, the children were explained that their role is a co-designer and design partner, helping to customize visual elements which was verified by showing the digital implementations of their ideas in the game.

10) Let the children explore but let them know the limitations of the system. Given the time and resources to explore designing game mechanics it would be

interesting to involve children with ADHD in designing the game mechanics to see what kind of things would get them focused and immersed. Though some indications of this was appearing during the workshop, creating the game mechanics was not part of this study. Furthermore, the children should be clearly explained the limitations of the system. For example, when coming up with the postures it was hard for them to understand what could be done in reality. Even though the participants had experience with active video games, they clearly needed more instructions on how the implemented postures can be like so that the game would still be playable.

This section discussed the outcomes of the game design goals, the outcomes of the facilitation goals and the feedback gathered from the participants. Design recommendations regarding organizing participatory design workshops for children with ADHD were provided.

6 DISCUSSION

Given its multidisciplinary nature, the study had variable limitations and requirements. Firstly, these include quick changes from both PSYKE and the project. This called for rapid adaptation and adjustments to the session planning, which can be common in PD (see e.g. Benton et al., 2014). There were also challenges with the amount of time available, scheduling, the activity selection, the small number of participants and their needs – not to mention dual-language of moderation. In order to improve the skill learning, more systematic execution could be implemented. This could have be done by having a more strict, almost a "school-like" atmosphere where the skills and how to practice them, would be repeated more often. On the other hand, this can reduce the element of fun and the fact that school might not be a pleasant activity for some children, should be taken into consideration. Willingham (2009, 1) has dedicated a whole book discussing the matter of why students do not like school from a cognitive scientist´s point of view. He notes that repetition, a commonly used technique in school environment, is good for learning but bad for motivation. That is, one of the concerns in this work was whether the development of the participatory design workshop would turn out to be too school-like with the four "I" -statements. This also raises the question of equality of the children – will they be considered as an equal part of the research team if they were practising the skills in an obvious and forced manner when the researchers did not? These issues were prevented by using the technique of environment modification and teaching the skills, although with repetition, in the form of gamification to increase motivation. Also, team equity was established by providing the children and the researchers with similar name cards.

Secondly, as this was an exploratory study that mainly gathered qualitative data, it should be mentioned that in these kind of cases the results rely on the point of view of the researcher and how they interpret the children's behaviour or comments. Without a strong background in psychology, analyzing behaviour in this work might not be as deep and systematic as would be

necessary in order to draw validated conclusions. However, as the data collected included artwork made by the children, the reasoning behind the artists´ choices and the assumed meanings translating in the game prototype are interpreted based on my professionalism as a graphic designer – which generally requires not only decoding the clients message but also converting it to a visually pleasing and functional piece of design. I also wanted to take into consideration the effect of commercial looking graphics: will children consider the game more "real" or interesting if it looks more like a commercial game – and would they recommend it to their friends? Due to certain limitations, this was not further explored in this thesis work, however, there were indications in the children's feedback that this detail was appreciated as they reported that trying out the game was nice. It still remains unclear whether the high enjoyment towards the game was affected by the commercial-like quality of the graphics or other factors. The children liked to comment on the game mechanics and suggested things such as that the pig could crouch and swim, instead of freezing there could be more moving (jumping jacks), or the pig could go faster a certain amount of time if they collected a star. Such ideas from the children with ADHD would be valuable in creating games for this specific target group. While probably drawing influence from other games, most of the ideas from the participants could have been practically implemented into the game given more time, which could turn into an interesting game design experiment itself.

Malivernі´s (2017) inclusive model for game design with children with special needs merges the therapeutic techniques, game design and children's interests into a coherent whole by following four steps in the process. These steps were also followed in this work with ADHD children, starting with defining therapeutic goals and the structure of the experience with the team. The second step gathered the contributions from the children and the third implemented these into the game prototype. The final step, the evaluation of game suitability for ADHD children, will be validated in the upcoming clinical trials, while the testing at the workshop sessions provided some clues on what to expect. Principles suggested in the D4D framework (Benton et al., 2014), such as consistent structure, visual schedules and ticking-off of activities, were used

in the Pigscape workshop with success. The implemented EXAT-strategies, highly structured program and the environment modification, were well suited for ADHD children. They were able to keep up with all activities similar to neurotypical children. They were able to achieve the goals that were planned. Likely, this is due to a highly structured program and walkthroughs the tasks by the facilitator. By using a visible agenda, the participants knew that despite the enjoyment they may have with a certain activity, they need to move forward to the next activity. However, this was not always the case. For instance, when writing the narrative, one ADHD participant was focused on finishing their story even after the session had ended. Wrapping up at the end was important to provide a conclusion and a sense of accomplishment. A constancy in setting has been suggested to support children with special needs in participatory activities (Malinverni et al., 2014). The environment modification ensured that the children did not consider the workshop as a school-like activity. Nevertheless, while the space might have felt rather exciting for children (for example, people were walking by the hallway and seeing through the window), ADHD children were not too distracted by it. Even though structure is important, especially for neurodiverse children, there should be a balance between that and freedom to choose (Malinverni et al., 2014) which can be a challenging mission to accomplish.

The gamification of the workshop was expected to make the workshop more interesting, motivating (see e.g Sailier, 2014; Gennari et al., 2017) and suitable for the target group. Children were able to successfully use the 4 I -skills and there was a visible improvement in both ADHD and neurotypical children. They were able to collaborate with others, focus on the task at hand, and were listening to others without interrupting. In respect to what the child participants might gain from their participation (see McNally et al., 2017), it should be highlighted that the participants reported enjoying this kind of activity and process – creating games in this format, were satisfied with all the game design tasks and would have been happy to continue the workshops further. Overall, it was positive to see that the children had fun and they were impressed to see their ideas implemented on the digital game, which shows that

goal of making children feel empowered was achieved. The observations from the workshop indicate that children with ADHD should be encouraged for creative work with "loose" restrictions. Children have great and novel ideas that other children seem to enjoy. Taking those ideas into account do not only add to the pleasure for the creator of the idea and the team, but also allows us to explore how these ideas would work in practise in a real digital application.

The workshop sessions took place after school. This meant that the participants were hungry when they arrived and this affected their mental state. It was decided to offer sandwiches and juice to keep their energy levels higher. This was considered a good idea as each time more than one child ate. The sessions were modified so that participants were able to take snacks right after they arrive and listen to the starting words and agenda at the same time instead of during a break. Iterations to the sessions happened after each session debriefing. For instance, if something considered importance took more time than intended, this was taken into account in the next session by adding or reducing its allotted time. Despite the moderation in dual-language being challenging (having to leave some nuances out from both languages), it also brought out some unexpected positive outcomes. There was a notable initiative to communicate in English from the Finnish speaking children to include the English speaker to the discussions and activities, especially from the other ADHD participant. They also reported, when interviewed in the end, that their English skills improved.

The game design goals were adjusted after observing how things would work in practice. For example, the preliminary goal that included thinking about the soundscape was dropped out completely as it would have not fit within the given timeframe. In the matter of organization, a separate bilingual notekeeper would have been beneficial since now the two bilingual researchers were in the role of the facilitator, and the observer filling out behaviour observation forms. Some of the skills were difficult to practise due to the nature of the sessions and the multilingual participants, most prominently the team work. The English speaker could not participate to their full potential because of this reason. The situation was managed so that the moderator translated the

discussion but that took away from the spontaneous group conversation. Also, this affected the teamwork which then was practised in a more subtle way; participating together in activities, discussing the ideas and giving feedback to others.

It is worth considering why this kind of PD workshop be a good way to design games. Will it serve the end users? Will it serve the therapeutic goals of the final product? As many studies regarding PD with children have suggested (Frauenberger et al., 2011; McNally et al. 2017), PD has a potential to include children into something special and creative. Regarding children ´s ideas and designs in this workshop, many of these were implemented to the actual game without too much modification and the participants appreciated those ideas from others. This would indicate that the ideas would serve the end users, when implemented correctly. Nevertheless, it is impossible to explore whether it serves the therapeutic goals of the final product, which remains to be seen as the game is used in clinical trials.

7 CONCLUSION

This thesis was focusing on exploring and evaluating how to create participatory design workshops for children that will help in designing a video game, getting children to feel empowered and help them learn valuable social skills. The first research question was how children follow the proposed workshop structure and activities, and investigate how EXAT-based components aid ADHD participants to get involved into design process and enhance their social skills. In addition, gamification elements were implemented in both the workshop structure and the activities. Thus, the second research question was whether and how implementing gamification elements to the workshop structure and activities affect children's motivation to cope with workshop activities and providing their impressions of the workshop? The research questions were answered by describing the workshop planning process in detail, the workshop sessions and activities in them with visuals and by providing a post-analysis on each.

The facilitation goals and the game design goals were intertwined. Combining both these sets of goals into an interesting workshop experience for children, especially those with ADHD, can be challenging in itself. As discussed in this thesis, participatory design and gamification can be used as one suitable mixed method, when planned logically and consistently. As serious games are aiming to blend therapeutic training into fun, this work was aiming to take the same idea into the workshop. More specifically, as these sets of goals are quite different from each other, some of the messages from both sides could be delivered by using the same gamification elements. For instance, to enhance the highly structured program, the progress bar, printable skills list and a points booklet with the corresponding icons were created. The children's good behaviour was rewarded with both verbal enforcements and with the stickers they could collect in their points booklets. The impression of progression was created with physical personal storage boxes and the progress bar, feeling of belonging to the group was eminent with both the team work and the staff cards, and enforcing the social rules was supported verbally, with the skills list

and the points booklet with the stickers. Everything had a consistent style and theme (see appendix 2) so that the participants would view the sessions and activities as of a one entirety and that there would not be an impression of separate goals, which could have been confusing. The visual elements were repeated in all of the prepared materials from the staff cards to the final memory booklet to aid children in following the whole workshop, the skills and the activities.

This thesis provided recommendations regarding participatory design workshop planning for children with ADHD. In addition to the intended outcomes of PD when working with children, whether neurodiverse or neurotypical, empowerment should be a focus. This is achieved through activities that are fun and engaging, by providing a choice of different methods for children to express themselves, by incorporating designs and creations, and by peers and adults acknowledging children's work.

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Appendix 1. Session plan and script example

SESSION/WORKSHOP 1:

Duration: 1 h 15 min from 15:30 till 16:45
Location: University of Tampere, Pinni B1029-1030
Participants: **Facilitators**: Nancy (Katariina)
Research team attenders: Jim, Sumita?, Julia - many researchers will pop up in the beginning to give a feeling of a "real team" to children, but adult researchers will soon leave and let children to work alone with the facilitators and 3 other researchers.
Children Research Advisory Group: 2 ADHD and 2 neurotypical children - Finnish/English speaking group

Theme: Filling out the forms, Introductions, discussion of the agenda of the session
Customization of the main character
Narrative

Game design goals:
Introduce how will the games look like now (graphics) Demo video
Customization of the main character - create a bond to the character
Create narrative "Setting up the game world"
What is the story of the pigs; why are they running? Where to/from are they running?
Find out what do children find fun, motivating and engaging in games in general. *What do children find interesting/relevant in the main game character/elements and the narrative that would make them want to play the game?*

Facilitation goals:
Teaching children social interaction skills "I participate" and "I am a team member" (e.g., "I statements", providing positive and negative feedback).
Teaching children to pay attention / concentrate "I pay attention": listen without interruptions, not leaving own place, etc.
Teaching children self-monitoring skills: following time-schedule and task accomplishment ("I am a timekeeper").

Expected results:
- Ideas of fun events and backstory for the pigs, funny characters, fun interactions.
- Children are able to actively take part in session activities, follow social rules modelled by a facilitator, convey own ideas to the team, and make joint decisions.

Methods and models:
User needs - design - refine
Participatory design
Model of inhibition and executive function (Barkley 1997); motivational models (Sonuga-Barke et al. 1992, 2002); Behavior modification and management; cognitive training; social skills training

What data and how is it collected: artefacts, notes, photos, recordings, drawings, creations
Observation form for each child for each part of the workshop? (see TOTAKU pg. 74)
Accomplishment booklet - decide metrics

How to analyze the data: qualitative data

Materials, Visual aids: Flip Board (at least two boards: one white board with the schedule, rules etc., one where key points are written (so that they are documented) during a specific activity, markers, coloring pencils, papers, printouts, scissors, cut outs, alarm pig.

Technical equipment: Video cameras, recording equipment, camera and someone taking photos

Space: Chairs, tables, walls, screen

Notes for next workshop: To avoid issues with two languages (waiting time for children while listening to the translation), have another researcher explain things in English for the English speaking child. As one

child has a personal relationship with the facilitator, have someone else talking to her. Children were shy at first but they warmed up as we moved forward and got to the crafty part of the workshop..

SCHEDULE & SCRIPT
NOTE: The script must be translated in Finnish if the children are Finnish
***The script is written in** blue, and instructions about skill practicing in red*

14:30 Preparations

- "DO NOT DISTURB" sign placed on the doors
- Furniture/tables arranged (whiteboards: local & from 0019, paper boards, poster boards - all arranged as a wall in front of the tables; snacks, water, paper cups, coffee for parents; pig progress bar on the poster board; write agenda on the small whiteboard; write the 4 skills that children will learn on a poster board close to their booklets?): Sumita
- Camera setups (if possible, arrange the second camera as well); taking pictures for the publication during a workshop: (Jim/Julia)
- Materials and artwork: Nancy

15:30 Introduction, Filling out forms, Instructions

'Welcome all and thank you for coming. My name is Nancy and this is Katariina and Antti - they speak Finnish. Julia, Vera and Jim speak English. Antti and Vera are game developers. They just popped-up here to say hi. They will leave soon but just to let you know that we are a big team of researchers. Us and some other researchers that you will meet later are developing a game that could help ADHD children to learn how to concentrate better. We invited you, children, to help us with the design of the game. Because you play a lot of games and we do not play games so much anymore, we will ask you to share ideas for a game that you think other children would have fun playing. You will be part of the development team as the Children Research Advisory Group. You are little scientists, working along with us, adult researchers, as equals.

There is one person who speaks only English. Do you others speak or understand English? OK, then I will speak both, English and Finnish.

[MOBILE PHONES OFF]: *Now, please, put the sound of your mobile phones off so that we are not distracted.*

[PARENTS ARE GIVEN INFORMATION SHEET TO READ]: *This is information sheet that we sent you by email earlier. Please, read it while I explain the workshop plan to children.*

[INFORMATION SHEET IS EXPLAINED TO CHILDREN IN SIMPLE WORDS]: *Now I will explain you, children, what we would like to do during the workshop. Please, ask your questions right away, if you have any. At the end, you need to decide, if you will take part in these workshop activities or not.*

[Show "progress bar" on the screen]

Fig. 1. Printable progress bar to show the progress of the sessions. During the first session there will be 1 pig, 2nd session 2 pigs etc. The star indicates the finalization and the award ceremony.

We planned that the workshop will have 5 sessions / visits. During the first 3 sessions, we will design the game. Those sessions are important so they are marked as dark green. We would be happy if you attend all three sessions, if possible for your time-schedule. Session 1 is about the main pig character and customizing it (we will decide how it looks like and make up a name for it). If we have the time, we also create some backstory for the game. Sessions 2 and 3 will be about designing collectables and thinking what magic powers a pig could have in the game. After each session, our software developers will implement as much as they can based on your input.

In session 4, the game should be ready and you would try it out so that we know how does it actually feel to play the game. Session 5 is a graduation ceremony and we will collect your feedback about the workshop.

At the end, we will thank you with movie tickets (2 tickets for 3 visits and 3 tickets for 5 visits).

We also will teach you useful skills of how to work as a team member, how to plan activities and follow the time-schedule. These skills are important for researchers and game developers.

We have never worked with children like this. So, we need to learn how did you feel and how we can improve this type of activities in the future. We will also ask your feedback during each session.

We are hoping that we can share the knowledge with other researchers, so that they also know how to organize design workshops with children. So, we will publish the results in a scientific paper.

You have the right to quit your participation in the workshop at any time, without any explanations. Just make a sign and tell this to me, Katariina or your parents, if they are here.

Do you have any questions?

If you agree with this plan, please, sign the consent form.

[Parents and children sign consent form]

We would like to make video recordings and photographs of the workshop so that we will not lose any of your artwork or ideas. We also will look at the recordings and analyze if we organized the session in a good way or we need to improve it somehow.

Do you allow us to make video recording of you during the workshop? If so, please sign the form.

[Parents and children sign video permission form]

[Children relocate to the actual workshop space with Nancy; remember to locate children according to their wish of being/not being videotaped; it is good to separate two neurotypical children on the other sides of the table; researchers are sitting by the table but not between the children]: *If you children will follow me to the other area so we can start the workshop.*

[PARENTS FILL IN BACKGROUND INFORMATION FORM with Katariina; Katariina checks if parents want to stay or leave]: *Parents can stay either here by the round table and have some coffee, or you are free to leave now. Come back at around 16:40. If you stay, please remember that these activities are only for the kids, you should not interrupt.*

15:40 Start of the workshop (*Agenda and discussion on agenda*)

[AGENDA IS SHOWN ON THE WHITEBOARD]: *Each time there will be a schedule on the board so we all know what we will be doing today. This is what we, researchers, do all the time. When we have a brainstorming meeting, we prepare and think exactly what we will be doing during the meeting. We will check often the time-schedule and our next steps. For today, the agenda is as follows:*

SCHEDULE
15:40 Introduction (10 mins) *First, we set up the rules of how we will be working together and learn what kind of skills are important for researchers and game developers. Then we will get to know each other.*
15:50 Workshop activity 1: (20 mins) *After this, in workshop activity 1 we will speak a bit about games that you like. After this we will customize the main character. This means that each of you would need to create own pig avatar using color paper and other materials. Then you would need to name your avatar.*
16:10 Break (5 mins): *We will have a short break. By the way, if you need to visit restroom, tell me or Katariina at any time.*
16:15 Workshop activity 2: (20 mins) *Then we will continue with the workshop. Each of you will present your own avatar to the group. After this, if we have the time, we will think of the narrative of the game where you get to invent the story of the pig.*
16:35 Relaxation & wrapping-up (feedback, conclusion notes) (5 mins) *We will end the session with going through how things went and we would like to hear what you liked or did not like about the workshop so we can improve workshop organization for next time.*
16:40 End of the session

[PRESENT AND DISCUSS THE SKILLS]: *We will practice 4 skills today. They are written here. These skills are important for everyone who wishes to work in a team as a researcher and game designer. These skills are need for the workshop to be a success (so that we achieve our goals from the agenda), they may also be important for us to have a pleasant time here.*

"I participate" *When researchers meet to discuss, for example, a paper writing or design something, all researchers are active participators. It is not enough to come to the meeting and "snore in the corner". Each researcher contributes some ideas. We would like you to participate and learn how to participate. This means that you would need to speak up at least once. There will be many chances for you to speak up, for example, when you present yourself or share your ideas with others. We would like to hear your voice and your ideas very much. Be brave and active!*

"I am a team member" *This means that you respect others and stay polite even if you disagree with someone, appreciate other children contributions and collaborate with your fellow colleagues. For example, today we will learn how to give a positive and negative feedback to other team members.*

"I pay attention" *This means that you will practice listening to someone's ideas. First of all, when you want to speak or ask something, look around and see if someone else is already speaking. It is not polite to interrupt. Wait for a good moment to speak up. If you have something extremely important and need to interrupt someone, raise your hand, stand up or knock the table, so that others can pay attention to you immediately. But remember that you can do it only if you have something really important to say to the team.*

Also, listening should be active. When you work in a team and there are many ideas floating in the air, it is important to give feedback to others. Because if everyone is only presenting own ideas and no one wants to listen and understand the ideas of others, there is no productive work. Today we will practicing in listening actively - you would need to listen and ask at least one question from your fellow colleague about his avatar.

"I am a timekeeper" *For this, we would need to have a help from Katariina or Julia. They will help us to stay on time by giving us a sound signal / squeezing this pig. Each time we hear this sound, we would need to stop whatever we have being doing and check from the board what is our next step. Today you all will be timekeepers. Once we complete a task on the board, one of you will come here and your job will be to tick it off our list. I will remind you about this each time.*

At the end of this session, you will get stickers for each time that you practiced these skills. A child that was exceptionally good at being active participant and member of the team will get a bonus steaker.

Do you have questions? Do you agree that these are the skills we will be practicing today? Do you have something to add? Ok, let's see how it goes. If you figure out other skills or rules that are important, please, let me know.

[Learn each other's **names** and make name tags. Give Staff cards and booklet] *Before anything else, we should know who we are. So as each of you will be part of the staff, we will give you staff cards. You can write your name on it and attach it on your shirt while you are here. Now we could introduce ourselves and tell one thing about ourselves. It can be hobbies, pets or your favourite food. Also, tell why do you like (or may be do not like!) games.*

[The model phrases are shown on the board]
I can start and I will give turn to the next person. My name is _____ and one of my hobbies is _____. I like / do not like games because _____.

[Indicate the next person to introduce themselves. Go over everyone.]

[Give each kid a **box** for their workshop creations, explain and let them know that we will keep all our stuff there for the next time as well.] *Now, we would like to give you these boxes for all of your workshop creations. You can keep all your stuff in these for the next time as well. I will call out a name and once you hear yours, come pick up your box, write your name on the note on top of it and leave on the side table over there. Then go back to your seat.*

15:50 Workshop Activity 1
[PIG ALARM, Nancy reminds that now a timekeeper ticks of the previous activity on the board and announces the next step]

[Discussion of previous gaming experience: what kind of games the kids have played and what do children find fun in these games? What kind of **interaction** in the game?

- Ask each child to tell at least 2 things, take out key points
- Make notes, record, write/draw out on the board?]

*Now, we can have a little discussion on your gaming experiences and you could tell **what kind of games you have played** and **what do you find fun in these games.*** [Write these questions on the board]
*Maybe everyone could think of at least 2 things to share with all of us. **Remember to practice "I participate", "I am a member of the team" and "I pay attention" skills! Try to be active, listen to other ideas and ask questions if you do not understand something.***
[If discussion does not evolve, take part and lead them.
Write the key points of the answers on the board. Repeat them.]

[Introducing the virtual game world and main character]
[GAME VIDEO ON A LAPTOP] *Next, we will take a look at the game software "mockup" or "prototype" in*

scientific terms. We could watch a short video of the game we have now so you see how it works and what it looks like. The pigs are running, they can jump and collect elements and gather points.

[Who is the pig and how does he or she looks like? What is the name of it?]
Now that you have seen the game, you might have some ideas how we could improve it. Next, I would like you to think about the main character, the pig. Who is the pig? What is the name of it? What does he/she look like? Do they have a family? Where are they from? Do they some accessories, like a hat, eye glasses and why? What would make him or her more interesting for you? Maybe you will come up with some improvements for the pig that will make him or her cooler.

[Give them black and white pig print out, children can color it, customize it and introduce it to others. Cut out pre-drawn accessories. Provide empty paper for free drawing.]

Fig. 2. Pre-drawn accessories that can be added on the black and white pig character to give some ideas for the children.

I have some pigs here (show the black and white pig) that I will give to you to enhance and modify. Make it look like something that you would like to see in the game. There are couple of limitations though. Do not change the outline of the pig. You can add things to it, dress it up, change the color or something like that. You can use this colored pencils and pens, cut out of some of the elements from these extra papers that I´m giving to you or draw something yourself. In case you don´t want to draw, I can help you with that. You can explain and I can draw your ideas. Don´t worry, these do not have to be top notch, just do your best. We would like to see your ideas because they are probably better than ours!

- Kids can draw, they explain, Nancy draws out their ideas if needed
- figures cut from paper -print outs of Piggly graphical elements that can be enhanced by drawing/coloring, max. 3 options, give space for kids to create own options: hats, accessories and cut them out to be added on - final ones will be presented on each child´s dedicated "wall"
- Help out the kids if they get stuck - make up new stuff to do in case they are fast/get bored ---> give modeling clay, help them to draw, ask guiding questions

16:10 BREAK
[PIG ALARM, timekeeper is reminded to tick of the previous activity on the board and announce a break]
Awesome, these are great! Now you have deserved a little break so feel free to relax, go to the washroom if you need to, or have some juice from the table. We will continue in 5 minutes.

[SNACKS ARE SERVED ON THE OTHER TABLE]
[Assistant takes kids to the washroom, helps otherwise if needed]

16:15 Workshop Activity 2
[PIG ALARM, timekeeper is reminded to tick of the previous activity on the board and announce next step]
[**Presentation of ideas**; Go through everyone's ideas and work, (everyone has 1-2 minutes, use the hourglass so the time is visible - let them explain, ask specific questions if needed)]
[Practicing "I participate", "I am a team member", "I pay attention"]
Ok, seems like it is time to see what you have created! Everyone can present their character: tell their name and few things about them, what do they like, where are they from, do they have family and so on. Also try to tell why you wanted them to look like that.

OK, ___ will be the first to tell us about her avatar. Remember children that when _____ speaks, you need to listen. Ask your questions when _____ finishes or the time runs out. Everyone asks at least one question!

_____, you can now go and attach your avatar on the wall, _____ will help you.

[4 different avatars ARE ON THE POSTER STAND]

- Select one idea for next workshop - **How to make collaborative work in deciding on the best idea as a group?**

Now, let's practice giving positive and negative feedback to others. You will come to the avatar that you like (not your own but someone's else) and say "I like this avatar because_____ but I think/feel that _____".

_____, you could be the first. Pick up an avatar of another kid and tell us why do you like it and... Researchers can also participate.

[**Story telling**]

Kids will tell the story of the pig: Turn taking in a group.
Kids can draw, use modelling clay etc.
Use storyboards etc.

- why and where to/from pigs are running?
- what pigs are collecting (coins, stars, fruit) and why?
- what magic powers can be collected and how can they be used in the game

Ok, we can move on to the next activity which will be making up the story of the pig. Now that you have created your own pig, think about why the pigs are running? Where are they coming from and where are they going? What are they collecting - are they coins, stars, fruit or something else? Why are they collecting them? What kind of magic powers can be collected in adventure trips and how can they be used in the game? What happens? Think about this for few minutes. We can even combine the stories.
Let them discuss freely for a moment

Collaborative storytelling time (chain story)
Nancy will draw/write on board if needed, kids can take turns and come to the board to either draw and explain or explain and let Nancy draw what is gonna happen next

Now we could come up with the story together. Everyone can take a turn, tell what happens and then the next continues. I can write or draw on the board or if you want, or you can come and draw yourself. So, I can start. Once upon a time, there was a pig who lived in ....

16:35 Relaxation and wrapping up
[PIG ALARM, timekeeper is reminded to tick of the previous activity on the board and announce next step]

[Ending the session, conclusion/summary and **discussion**, reward the kids from this one *(booklet where to collect accomplishments = sticker from each activity/session)]* *It is time now to finish for today. Before that, I would like to give some feedback to you. I am happy to see that all of you followed the rules really well. Since you did so good, we will give you the points for your booklet now.*

Now, I would also like to hear your opinions how did you like the workshop. What was fun? What wasn´t? Say "I liked _____ because... or I didn't like _____ because..."

NExt, say at least one thing what did you learn today.

[what happens in the next workshop, collecting name tags, artworks etc to everyone´s own folder/box]
Thank you for these comments! On the next workshop, we will continue designing the scenery and maybe think of things that the pig can pick up and collect and maybe also the obstacles the pig might encounter.

Thanks again and we´ll see you next time! Everyone who needs to wash their hands, follow Katariina.

16:40 End of the session

Label material / notes

Appendix 2. Printed graphic material created

From top left: Posters for the doors indicating there is a workshop in progress, the cover for the booklet given to the children on the last session, points booklet page, points booklet cover, staff/name card

Diplomas given to the participants on the last session

The physical booklet given to the children on the last session. The booklet was printed in both English and Finnish.